XYPOWERSPORTS

Service Manual

XY500UTV/XY500LUTV

XY500UE/XY500UEL

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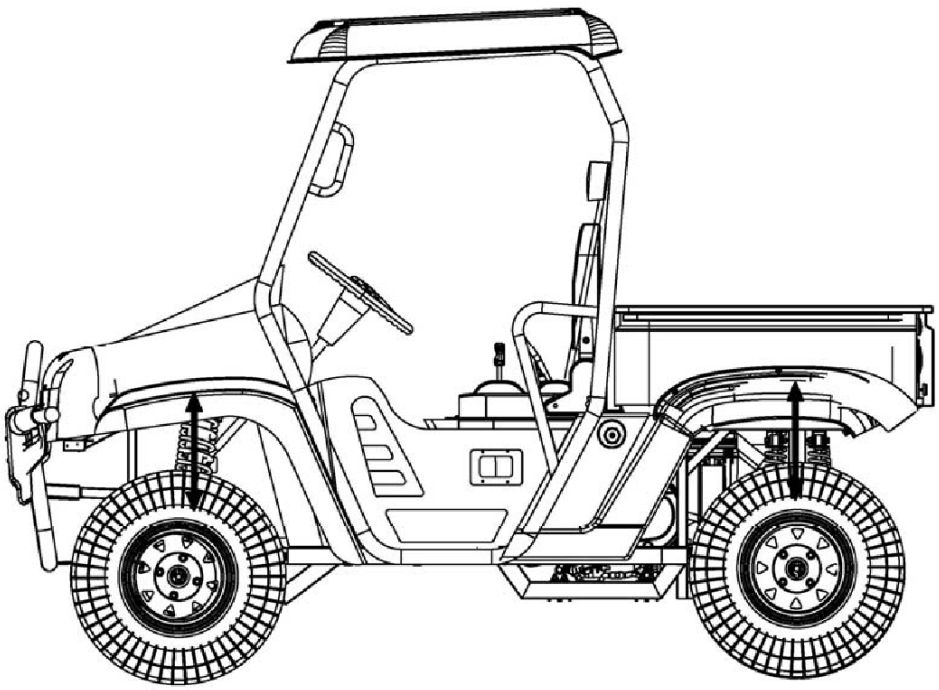

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xypower

信阳动力

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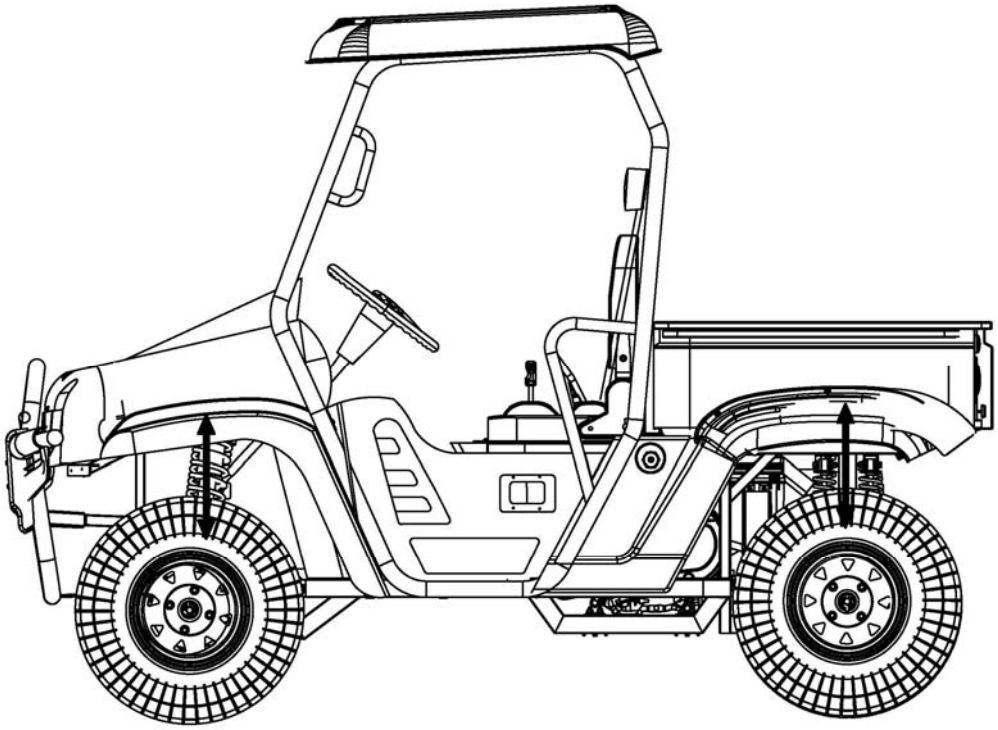

ZHEJIANG XINYANG INDUSTRY CO.,LTD.

FOREWORD

This service manual is designed primarily for use by certified XINYANG Master Service Dealer technicians in a properly equipped shop and should be kept available for reference. All references to left and right side of the vehicle are from the operator's perspective when seated in a normal riding position.

Some procedures outlined in this manual require a sound knowledge of mechanical theory, tool use, and shop procedures in order to perform the work safely and correctly. Technicians should read the text and be familiar with service procedures before starting the work. Certain procedures require the use of special tools. Use only the proper tools as specified.

This manual contains an introductory description of procedures for inspection，maintenance, overhaul，disassembly & assembly，removal and installation of components and parts, troubleshooting and service data together with illustrations of our UTV Model XY500 and XY500L.

The manufacturer reserves the right to make improvements or modifications to the products without prior notice. Overhaul and maintenance should be done according to the actual state and condition of the UTV.

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A Few Words About Safety

Service Information

The service and repair information contained in this manual is intended for use by qualified, professional technicians.

Attempting service or repairs without the proper training, tools, and equipment could cause injury to you or others, It could also damage the vehicle or create an unsafe condition.

This manual describes the proper methods and procedures for performing service, maintenance, and repairs. Some procedures require the use of specially designed tools and dedicated equipment. Any person who intends to use a replacement part, service procedure or a tool that is not recommended by XinYang, must determine the risks to their personal safety and the safe operation of the vehicle. If you need to replace a part, use genuine XinYang parts with the correct part number or an equivalent part. We strongly recommend that you do not use replacement parts of inferior quality.

For Your Customer is Safety

Proper service and maintenance are essential to the customer is safety and the reliability of the vehicle. Any error or oversight while servicing a vehicle can result in faulty operation, damage to the vehicle, or injury to others.

For Your Safety

Because this manual is intended for the professional service technician, we do not provide warnings about many basic shop safety practices (e.g., Hot parts-wear gloves). If you have not received shop safety training or do not feel confident about your knowledge of safe servicing practice, we recommended that you do not attempt to perform the procedures described in this manual.

Some of the most important general service safety precautions are given below. However, we cannot warn you of every conceivable hazard that can arise in performing service and repair and procedures. Only you can decide whether or not you should perform a given task, can cause you to be seriously hurt or killed.

Important Safety Precautions

Make sure you have a clear understanding of all basic shop safety practices and that you are wearing appropriate clothing and using safety equipment. When performing any service task, be especially careful of the following:

- Read all of the instructions before you begin, and make sure you have the tools, the replacement or repair parts, and the skills required to perform the tasks safely and completely.

- Protect your eyes by using proper safety glasses, goggles or face shields any time you hammer, drill, grind, pry or work around pressurized air or liquids, and springs or other stored-energy components. If there is any doubt, put on eye protection.
- Use other protective wear when necessary, for example gloves or safety shoes. Handing hot or sharp parts can cause severe burns or cuts. Before you grab something that looks like it can hurt you, stop and put on gloves.
- Protect yourself and others whenever you have the vehicle up in the air. Any time you lift the vehicle, either with a hoist or a jack, make sure that it is always securely supported. Use jack stands.

Make sure the engine is off before you begin any servicing procedures, unless the instruction tells you to do otherwise. This will help eliminate several potential hazards;

- Carbon monoxide poisoning from engine exhaust, Be sure there is adequate ventilation whenever you run the engine.
- Burns from hot parts or coolant. Let the engine and exhaust system cool before working in those areas.
- Injury from moving parts. If the instruction tells you to run the engine, be sure your hands, fingers and clothing are out of the way.

Gasoline vapors and hydrogen gases from batteries are explosive. To reduce the possibility of a fire or explosion, be careful when working around gasoline or batteries.

- Use only a nonflammable solvent, not gasoline, to clean parts.
- Never drain or store gasoline in an open container.
- Keep all cigarettes, sparks and flames away from the battery and all fuel-related parts.

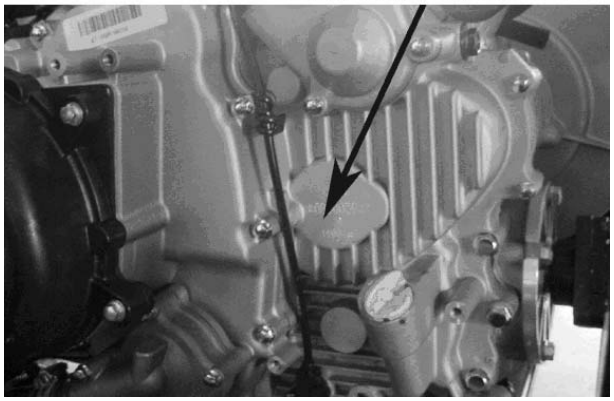
Conversion Table

Item	Example	Conversion
Pressure	200Kpa(2.00kgf/cm^2) 33kpa(250mmHg)	1kgf/cm^2=98.0665kpa 1kpa=1000pa 1mmHg=133.322Pa=0.133322Kps
Torque	18N· m(1.8kgf-m)	1kgf· m=9.80665N· m
Volume	419ml	1ml=1 cm^3=1cc 1l=1000cm^3
Force	12N(1.2kgf)	1kgf=9.80665N

Identification number records

Record the vehicle identification number and engine number in the spaces provided for assistance when ordering spare parts from your dealer or for reference in case the vehicle is stolen.

ENGINE NUMBER



VIN NUMBER

Vehicle Identification Number (500UTV): LCXRSTS1~
Vehicle Identification Number (500LUTV): LCXLSTS1~
Vehicle Identification Number (500UE): LCXRSTS3~
Vehicle Identification Number (500UEL): LCXLSTS3~
Engine Number: CF188
Engine Number（EFI）: CF188-B

NOTE: The vehicle identification number is used to identify your machine.

Main Data Table

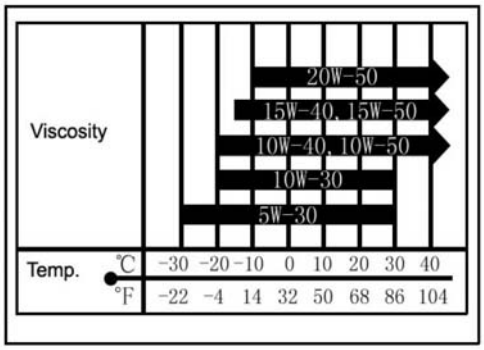
Item			Parameter	
Model			500UTV/500UE	500LUTV/500UEL
Length			2600mm	3200mm
Width			1280mm	1300 mm
Height			1960mm	1880mm
Wheel base			1760mm	2440mm
Engine type			500UTV/500LUTV:CF188 500UE/500UEL:CF188-B	
Displacement			493ml	
Fuel type			Unleaded gasoline 93octane or above	
Mass of whole equipments (Not include driver)			580kg	720 kg
Number of Passengers			2 for 500UTV/500UE, 4 for 500L UTV/500UEL (including driver)	
Max. Load			300Kg	
Tire		Front	25×8-12	
		Rear	25×10-12	
Minimum turning radius			4200mm	4900mm
Engine	Starting		Electrical starting	
	Form		Single cylinder, four-stroke, liquid cooling, 4 valves, OHC	
	Combustion Chamber Type		Triangle	
	Valve Driving Type		SOHC /Chain Drive	
	Bore × stroke		87.5×82.0 mm (3.4×3.2 in)	
	Compression ratio		10.2:1	
	Lubrication Type		Pressure and splash lubricating type	
	Lowest fuel consuming rate (g/Kw·h)		⩽ 340g/Kw · h	
	Idling speed (r/min)		500UTV/500LUTV:1300±100	500UE/500UEL:1400±100
	Starting system		Electrical starting	
	Spark Plug type		DPR7EA-9(NGK)	
	Lubricating oil category		SAE 15W—40/SF	
	Engine oil pump type		ROTOR	
	Oil filter type		Whole way paper filter element	

Item			Parameter
Engine	Fuel type		Higher class than RQ-93
	Transmission		V-belt with teeth on, auto stepless gear change, plus gear change cam with change gear transmission
	Gear change type		Gear lever with hand
	Clutch type		Wet, hoof centrifugal type
	Primary speed change ratio (stepless speed change)		0.703—2.88
	Speed change ratio：		Total speed reduce ratio
	H Gear: 3.514		2.47—10.12
	L Gear: 5.857		4.12—16.87
	R Gear: 3.828		2.69—11.02
	Cooling type		Closed cooling fluid circulating
	Cooling fluid type		Antifreeze with prevent rust
	Out dimension		610 × 568 ×519
	Net weight		70kg
	Output type		Front and rear shaft output
	Shaft running direction		Clockwise (from back of engine).
Fuel Device	Air Filter type		Sponge element filter
	Valve	Type	CF188-B-173000
		Diameter of mixing valve	36mm
Gearing	Clutch	Type: Wet, Auto-Centrifugal	
	Operation mode	Automatic (CVT) + Parking & Gear shifting	
	Gears shift	Low Gear, High Gear & Reverse Gear	
	Shift Mode/order	Manual /L-H-N-R	
	(CVT) Transmission Ratio	2.88～ 0.70	
	Gear Ratio	Final Ratio	1.333（24/18，Bevel Gear）
		Secondary transmission	1.952（41/21）
		Gears	Low Gear : 2.25(36 /16) ； High Gear : 1.350(27/20)； Reverse Gear : 1.471(25/17)
		Total	Low Gear5.857 ; High Gear : 3.514； Reverse Gear：3.828
	Axle Ratio	Front Axle	33 / 9 = 3.667
		Rear Axle	33 / 9 = 3.667

Item			Parameter
Gearing	Engine Output Mode		Front/Rear Shaft
	Direction of Output Rotation		Clockwise on forward shift
Steering device	Steering angle	Right	35°
		Left	35°
Brake type		Front	Hydraulic Disc
		Rear	Hydraulic Disc
Bumper Device	Suspension		Swing Arm
Frame type			Welded steel tube and plate

Overhaul Datasheet

Lubricating device

Item		Standard	Service limit
Engine Oil Capacity	Volume when replacing	1900ml	—
	Full capacity	2200ml	—
Recommended Oil (see original) 		● Specially for 4-stroke motorcycle SAE-10W-40、20W-50 Substitutes must be used in the following range. ●API type: SE or SF grade ●SAE type: Choose from the left chart according to the environmental temperature	
Oil pump Rotor	Gap between inner and outer rotors	0.03~0.10mm	0.15mm
	Gap between outer rotor and body	0.03～0.10mm	0.12mm
	Oil pressure	130-170KPa(18.85PSI-24.66PSI) at 3000RPM	

Air Inlet System

Item		Standard
Fuel Tank Capacity	Full capacity	22L
Valve		CF188-B-173000
Inlet Pressure Sensor		CF188-B-175000
Inlet Temperature Sensor		CF188-B-177000
Air Bypass Valve		CF188-B-172000
Injector		CF188-B-171000
Idle Speed		1400±100rRPM

Cooling Device

Item			Standard
Coolant capacity		Full Capacity	2620ml
		Reservoir tank capacity	300 ml
		Standard Density	45%
Opening pressure of radiator cap			108kpa(1.1kgf/cm^2)
Thermostat		Temperature / valve open	72±2℃
		Temperature/valve full open	88℃
		Overall lift	3.5-4.5mm/95℃
Temperature of Thermostat	Close–Open	88℃ (190.4F)Round	88℃ Round
	Open-Close	82℃ (179.6F)Round	82℃ Round
Coolant Type	-35℃ anti- freeze, antisepsis, high-boil coolant.		

Front/Rear Wheel

Item			Standard	Service Limit
Front Wheel	Play of wheel rim	Vertical	1.0mm	2.0mm
		Horizontal	1.0mm	2.0mm
	Tire	Groove	—	3.0mm
		Pressure	21±1PSI(145±6.9KPa)	—
Rear Wheel	Play of wheel rim	Vertical	1.0mm	2.0mm
		Horizontal	1.0mm	2.0mm
	Tire	Groove	—	3.0mm
		Pressure	28±1PSI(193±6.9 KPa)	—

Brake System

Item		Standard	Service Limit
Front brake			
	Brake disc thickness	17mm	16mm
Rear brake	Brake Pedal Play	0mm	
	Brake disc thickness	17mm	16mm

Battery、Charging System

Item			Standard
AC magneto Motor	Model		Permanent magnet AC type
	Output		3- phase AC
	Charging coil Resistance (20℃)		0.2-0.3Ω
Rectifier	Three-phase annular rectification, Silicon controlled parallel-connected regulated voltage		
Battery	Capacity		12V36Ah
	Terminal point voltage	Fully charged	12.8V
		Insufficient charge	<11.8V
	Charging current/time	Standard	0.9A/5~10H
		Quick	4A/1H

Ignition system

Item		Standard
Ignition(Carburetor)		CDI ignition
Ignition(EFI)		ECU ignition
Spark Plug	Type	DPR7EA-9(NGK)
	Optional	DR8EA, D7RTC
	Spark plug gap	0.8-0.9mm
Ignition timing(Carburetor)	Max. advanced angle	32°CA
Ignition timing(EFI)	BTDC10ºCA 1500r/min	
Peak voltage	Ignition	Above 200V
	Pulse Generator	2V
Starter Relay Coil Resistance	3Ω-5Ω	
Secondary Starter Relay Coil Resistance	90Ω-100Ω	

Screwing moment of important bolts

Engine：

Sequence number	Item	Quantity	Thread diameter mm	Torque (N·m)	Remark
1	Sensor of reverse gear	1	M10×1.25	20	
2	Spark plug	1	M12×1.25	18	
3	Sensor of water temperature	1	Rc1/8	8	Spread thread glue
4	Adjust nuts of air valve gap	4	M5	10	
5	Nut of driving disk	1	M20×1.5	115	
6	Nut of driven disk	1	M20×1.5	115	
7	Round nut of driven disk	1	M30×1	100	
8	Nut of front output axle	1	M14×1.5	97	
9	Nut of driving prick gear	1	M22×1	145	
10	Nut of driven prick gear	1	M16×1.5	150	
11	Fixed nut of clutch	1	M18×1.5	70	Turn left
12	Nut of position limitation of driven gear	1	M60	110	Put on thread sealing glue
13	Nut of position limitation of front output bearing	1	M55	80	Put on thread sealing glue, left
14	Bolts of swing arm axle	2	M14×1.25	28	
15	Drain bolt	1	M12×1.5	30	
16	Clutch installing bolts	6	M8	26	Spread thread glue
17	Stator of magneto Bolts	3	M6	10	Spread thread glue
18	Screws on CVT stopping wind board	3	M6	10	Spread thread glue
19	Oil pipe connecting bolts	2	M14×1.5	18	
20	Oil pump installing bolts	3	M6	10	

21	Bolts on pressure limiting valve	2	M6	10	
22	Bolts on principal prick gear cover	4	M8	32	
23	Bolts on driven prick gear cover	4	M8	25	
24	Gear positioning bolt	1	M14×1.5	18	
25	Bolt on hand start disk	1	M10×1.25	55	
26	Bolts on crankcase	14	M6	10	
		3	M8	25	
27	Bolt on Gear changing sector gear	1	M6	12	
28	Bolt on oil filter	1	M20×1.5	63	
29	Bolts on start motor	2	M6	10	
30	Bolts on cylinder cover	4	M10	38	
31	Nuts on cylinder cover	2	M6	10	
		1	M8	25	
32	Bolts on cylinder	4	M6	10	
33	Bolt on cover of cylinder	12	M6	10	
34	Bolts on chain adjuster	2	M6	10	
35	Nuts on chain adjuster	1	M8	8	
36	Bolts on fan motor	3	M6	10	
37	Bolts on constant temperature unit	2	M6	10	
38	Bolts on pump cover	3	M6	6	
39	Bolts on pump	2	M6	10	
40	Bolts on circulationunit	2	M6	15	Put on thread glue
41	Other Bolts		M5	4.5~6	
			M6	8~12	
			M8	18~25	

FRONT, REAR SUSPENSION:

s.q.	Item	Qty.	Thread diameter mm	Torque (N·m)	Remark
1	Bolts on front steering joint and absorber	4	M12×60	45~50	
2	Bolts on front and rear brake disk	16	M10×30	45~50	
3	Bolts on front brake Caliper	4	M10×30	45~50	
4	Bolts on rear brake Caliper	4	M12×30	55~60	
5	Bolts on support frame of front and rear break sub-pumps	4	M12×20	55~60	`
6	Bolts on front steering joint connector and beam pin	2	M10×30	45~50	
7	Nuts of front and rear sub-axles	4	M18	180~200	
8	Nuts of pulling rode connector	2	M10	45~50	
9	Bolts on Steering assy	4	M10×30	45~50	
10	Bolts on steering transfer fork	2	M8×25	23~25	
11	Screws on steering column	2	M10×25	45~50	
12	Nuts on front absorber	2	M8	23~25	
13	Screw of winch	4	M8×16	23~25	
14	Screw of main brake pump	2	M10×60	45~50	
15	Bolt on push rode of main brake	1	M10	45~50	
16	Bolt on beam pin of push rode of main brake	1	M8×20	23~25	
17	Nuts of flange of drive shaft	4	M14	100	
18	Nuts on tyre	16	M12	55~62	
19	Bolts on ceiling	4	M8×55	20~25	
20	Bolts on hand brake	2	M8×20	20~25	
21	Bolts on bumper	2	M10×20	50	
22	Bolts on driving axle	2	M8×25	30	
23	Bolts on flange and rear wheel upper swing arm	1	M12×90	45~50	
24	Bolts on flange and rear wheel lower swing arm	2	M12×180	45~50	
25	Nuts on front axle gear box	2	M10	45~50	
26	Screw on front axle motor	4	M8×20	10~13	
27	Screw on front and rear axle pin shaft	12	M8×22	20~25	Spread thread glue
29	Nut on front axle	1	M14×1.5	55~62	
30	Bolt on oil intake of front axle	1	M14×1.25×12	23~25	

31	Drain bolt on front axle	1	M10×1.25	23~25	
32	Bolts on rear axle box	2	M10×1.25×25	35~40	
33	Bolts on rear axle box	4	M8×25	23~25	
34	Nut on rear axle input shaft	1	M12×1.25	58~62	
35	Bolts on base of rear axle input shaft	4	M8×30	20~25	
36	Bolt on rear axle positioning	1	M65×1.5×10	85~90	
37	Nut	1	M8	12~16	
38	Drain bolt on rear axle	1	M14×1.25×12	23~25	
39	Bolt on oil intake of rear axle	1	M20×1.5×12	23~25	

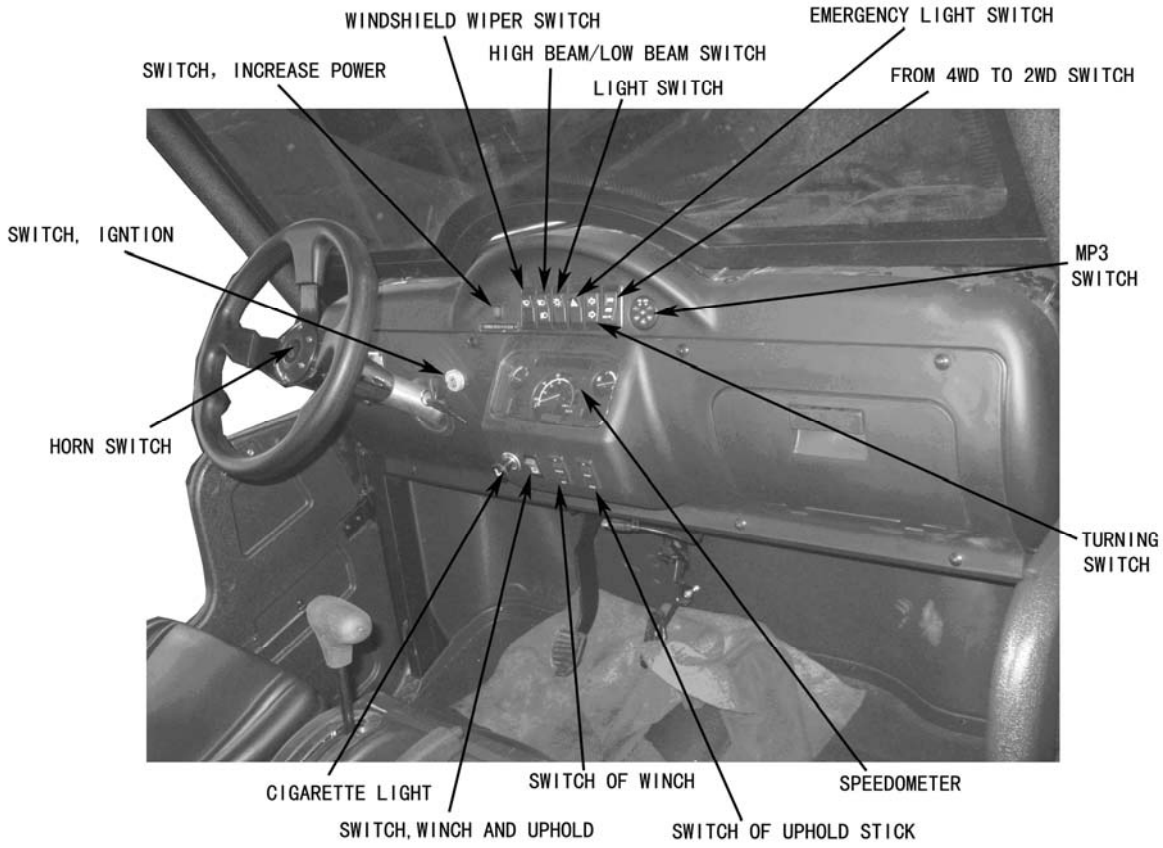
	Specification	Tightening moment
Other screws（8.8 grade）	M6	8~12N·m
	M8	18~25N·m
	M10	40~50N·m
	M12	50~60N·m

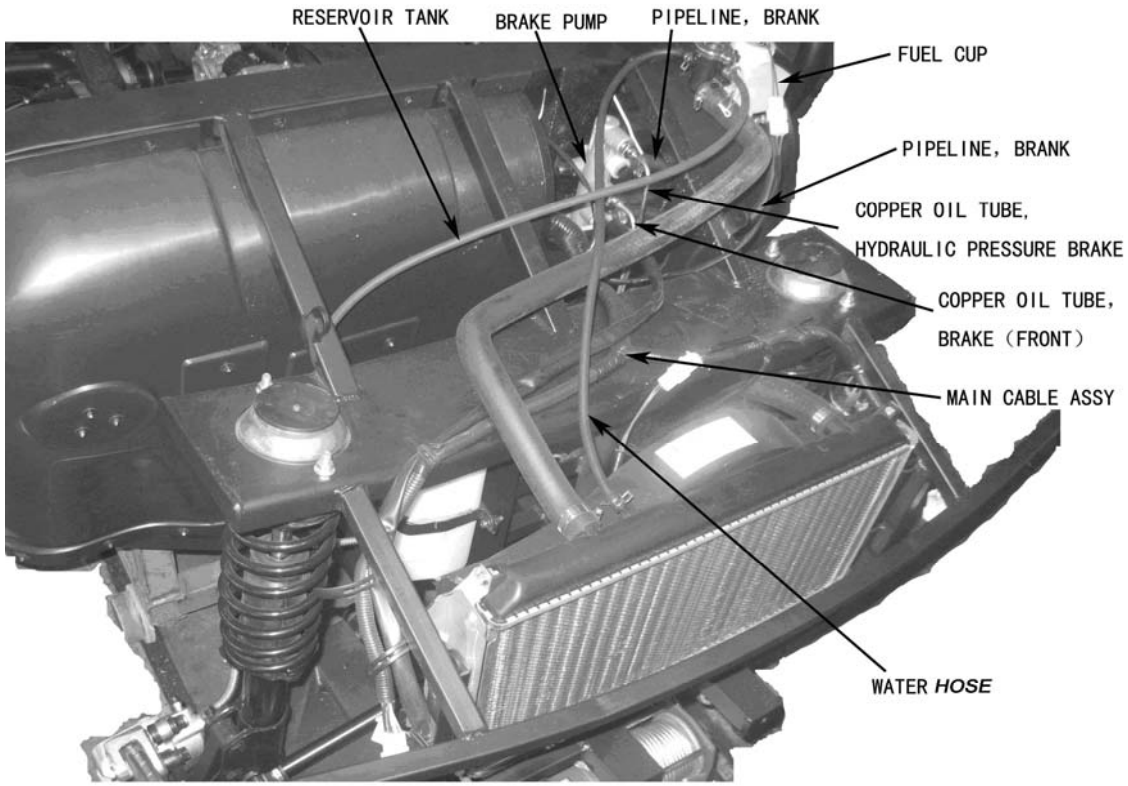
Specification and usage quantity for fuel

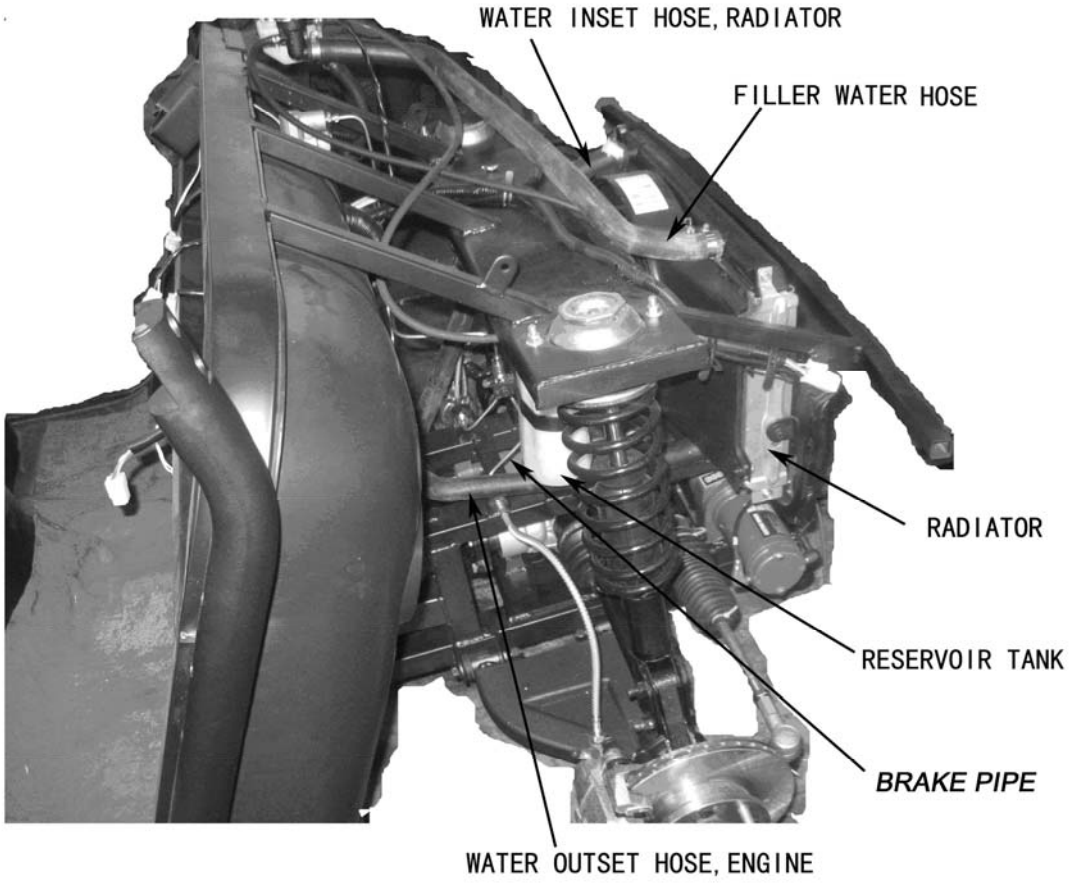
lubricating oil and brake liquid

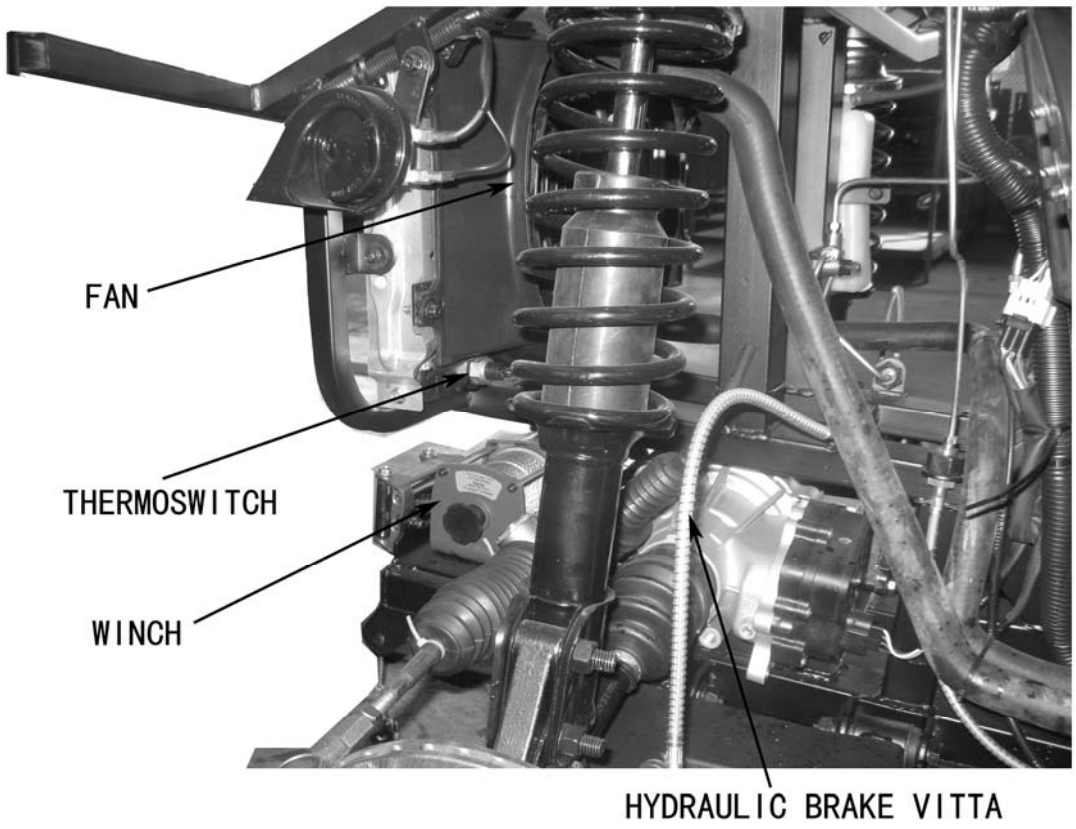
Category	Specification	Capacity	Remark
Fuel	RQ-93or upper grade lead-free gasoline	22L	Content of fuel box
Lubricating oil（engine, Gear box）	SAE15W—40/SF or SC	1900ml(change oil) 2000ml(change filter) 2200ml(repair engine)	
Lubricating oil （front main driver）	SAE15W—40/SF or SAE80W—90/GL-4	First 0.33L/change 0.28	
Lubricating oil (Rear main driver）		First 0.30L/change0.25	
Brake liquid	GB1083 JG3	1.1L	
Engine coolant	Distilled water: Glycol =1:1		

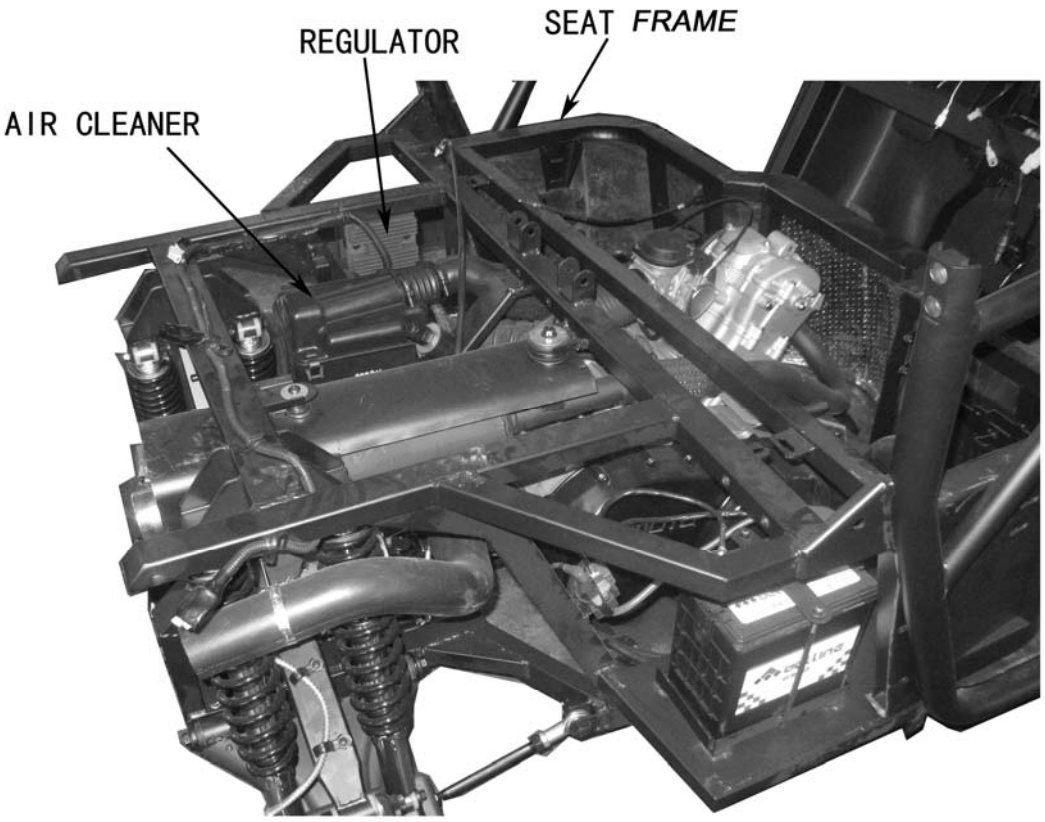
Cables, Pipes, Cable Routing



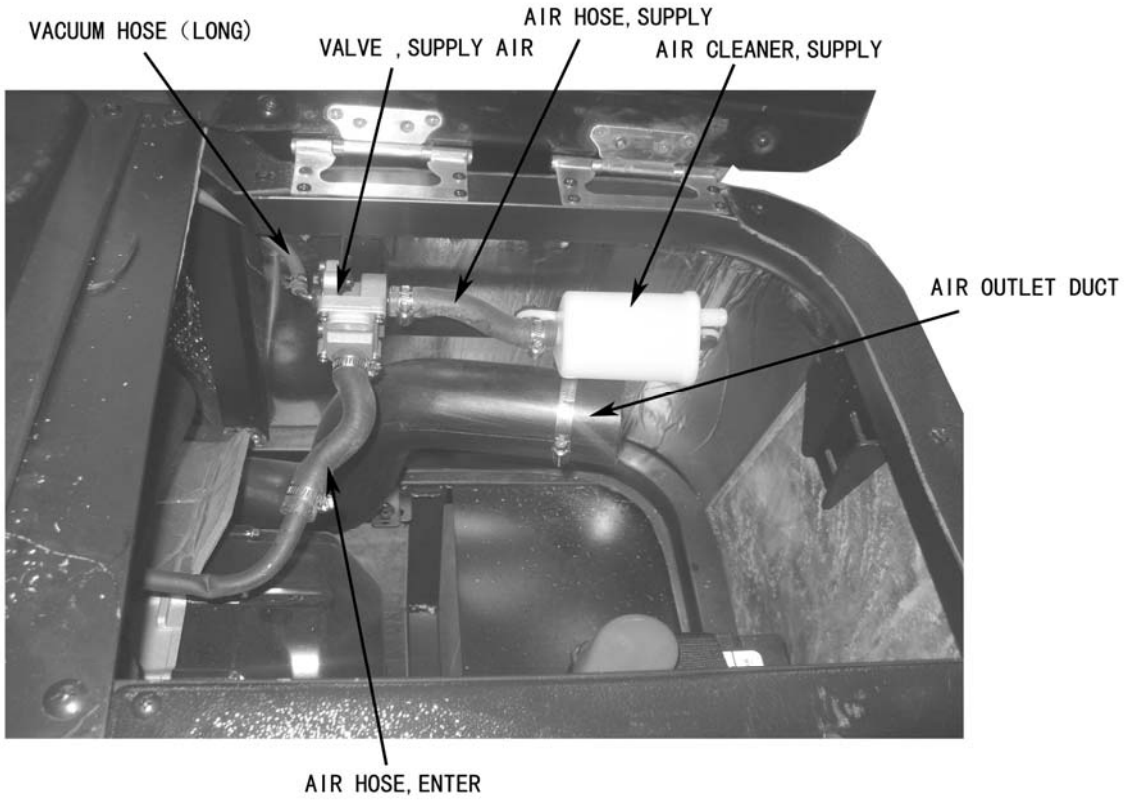



WATER INSET HOSE, RADIATOR
FILLER WATER HOSE
RADIATOR
RESERVOIR TANK
BRAKE PIPE
WATER OUTSET HOSE, ENGINE


FAN
THERMOSWITCH
WINCH
HYDRAULIC BRAKE VITTA



Carburetor Condition:



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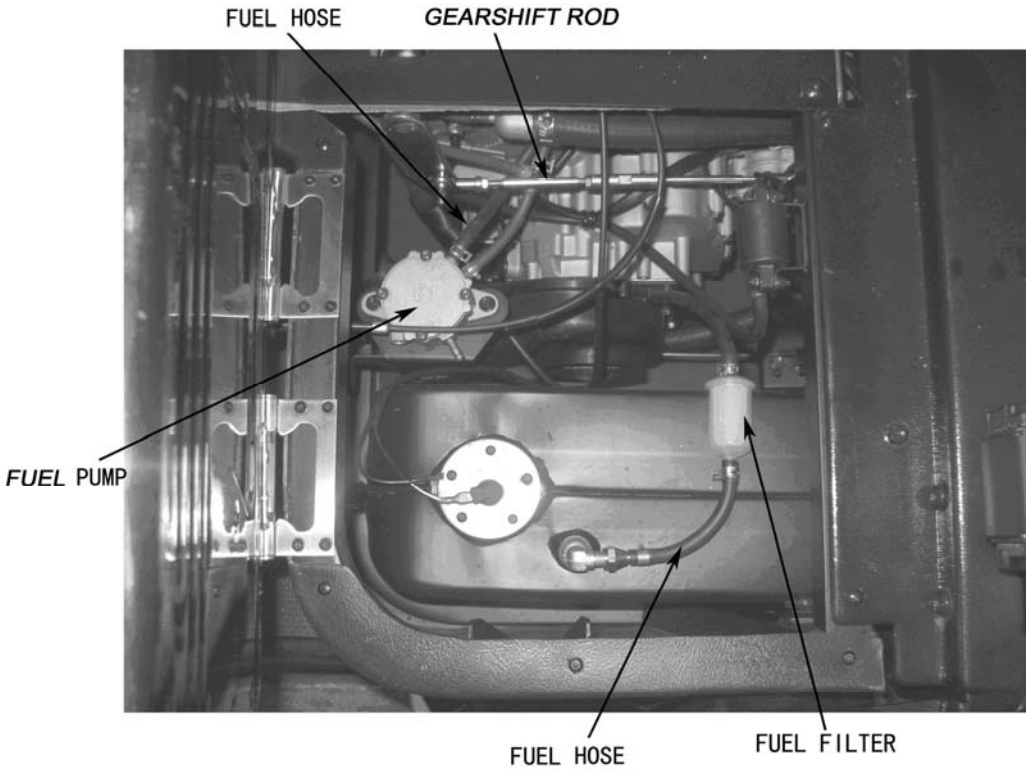
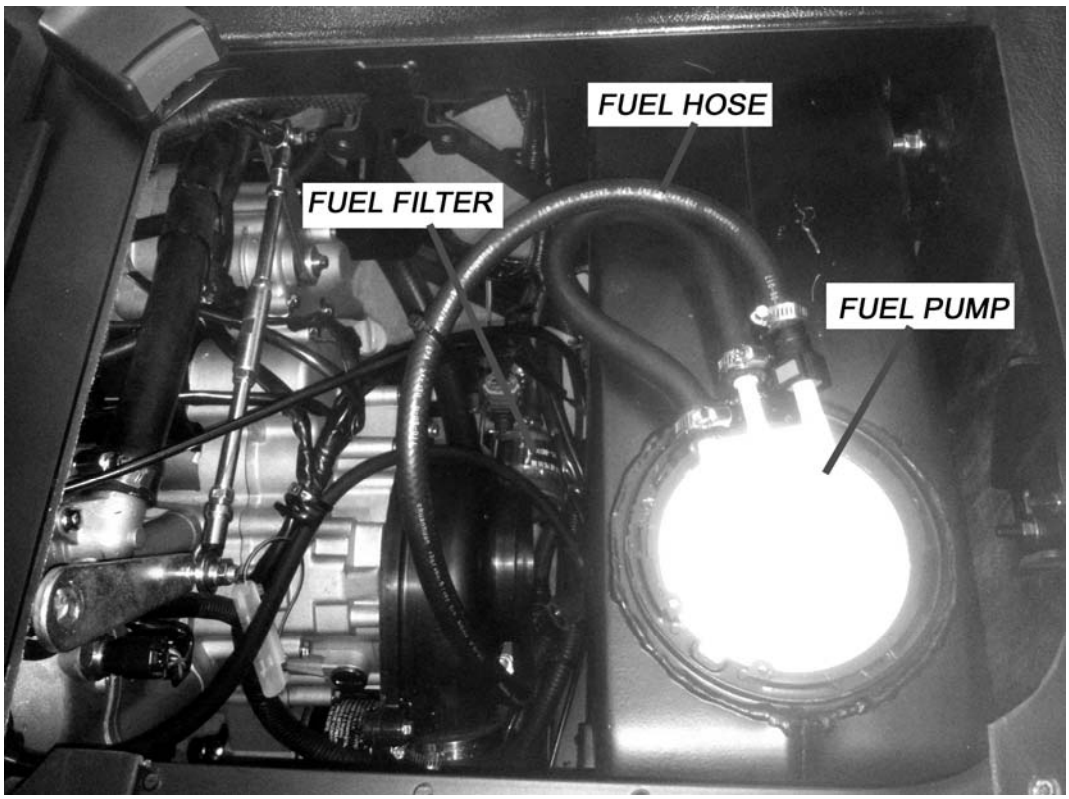
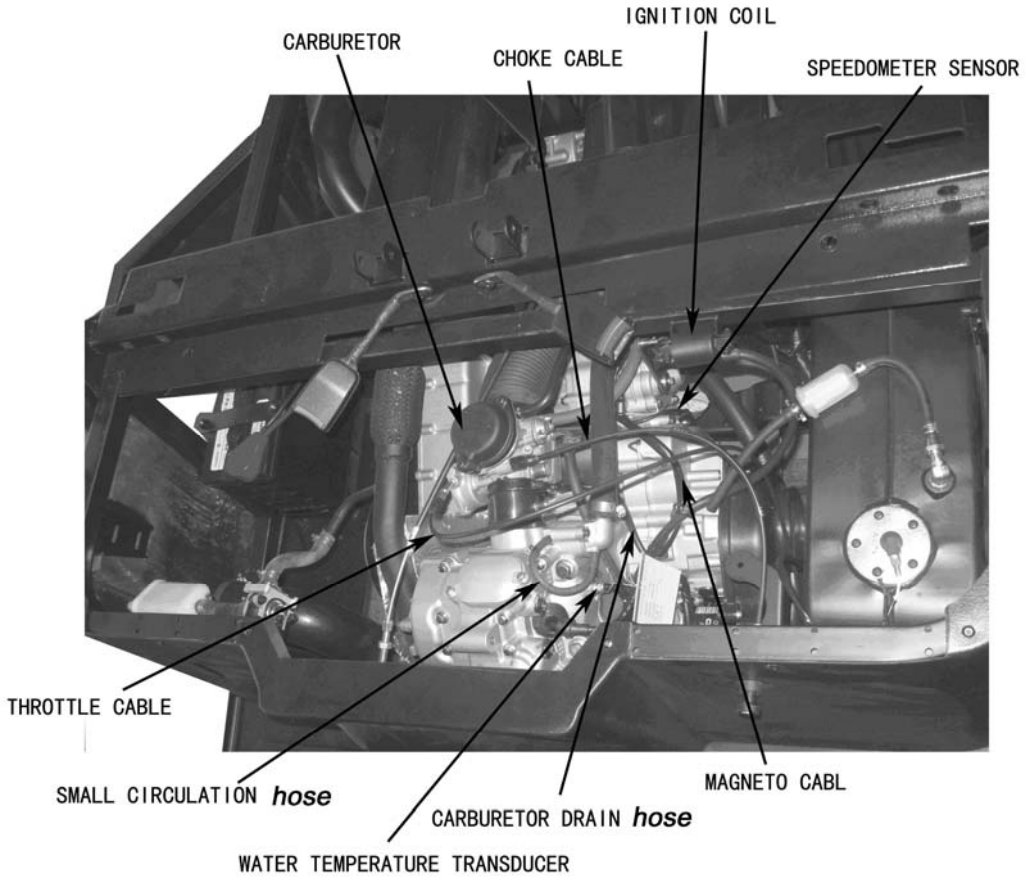
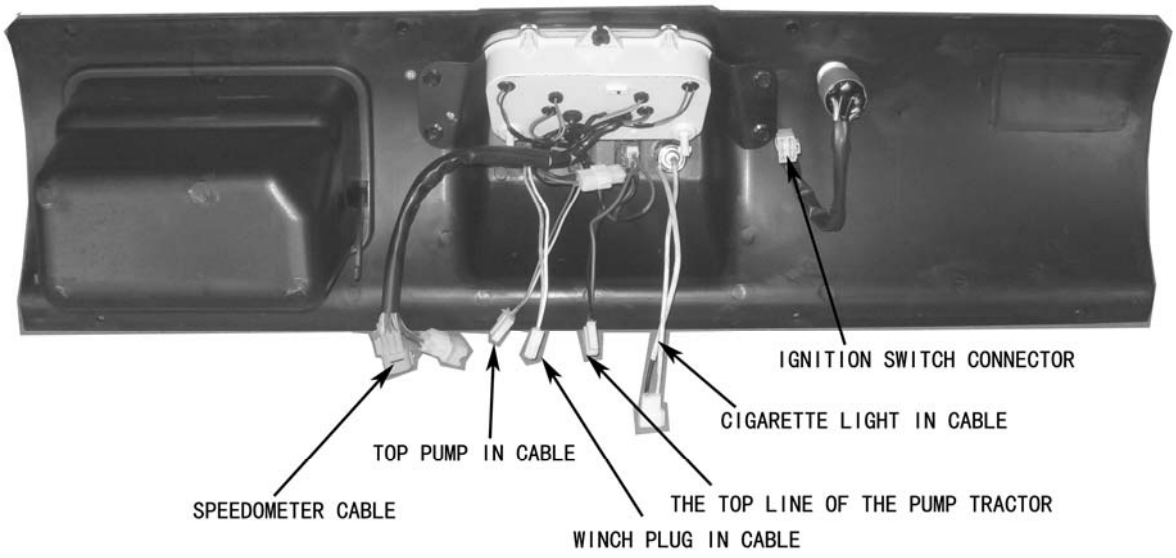


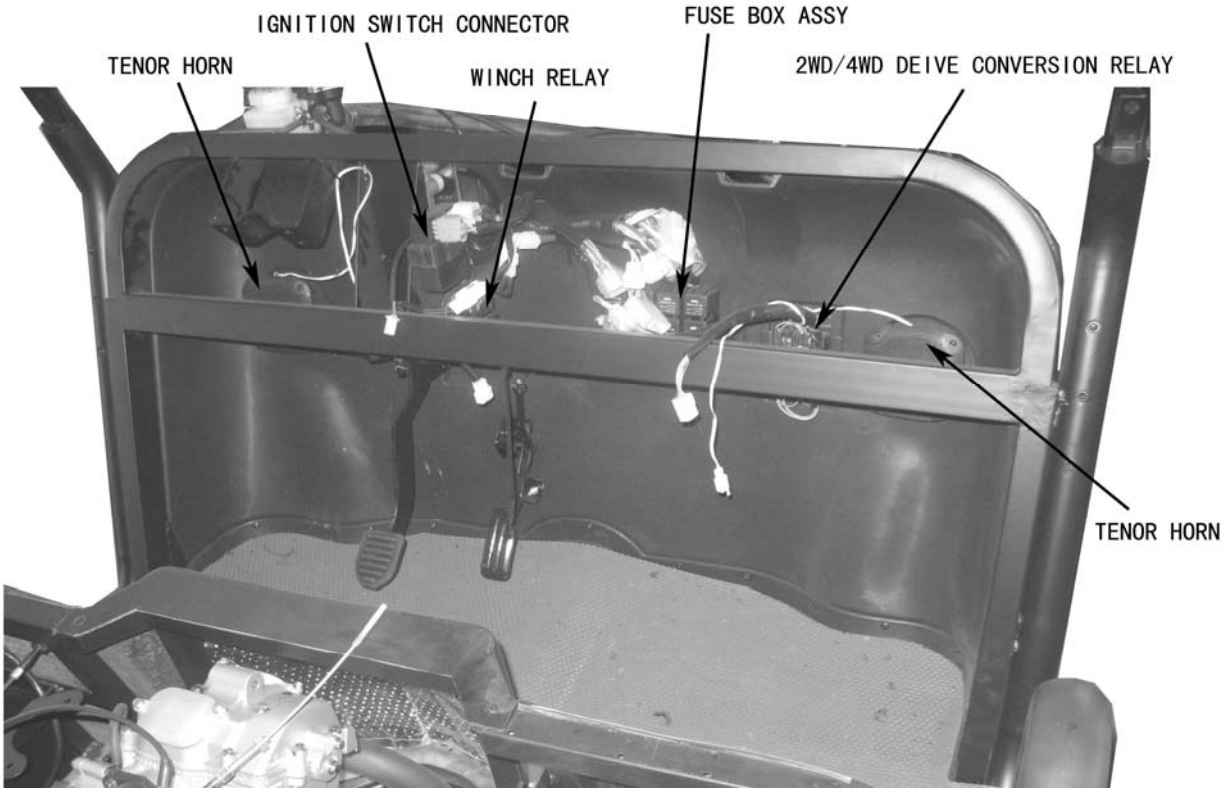
EFI Condition:



Carburetor Condition:






IGNITION SWITCH CONNECTOR
FUSE BOX ASSY
TENOR HORN
WINCH RELAY
2WD/4WD DEIVE CONVERSION RELAY
TENOR HORN

Overhaul info……2-1
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Handle, parking brake& skid plate……2-8
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Overhaul Information

Operation Cautions

Warning

Gasoline is highly flammable, therefore smoke and fire are strictly forbidden in the work place. Special attention should also be paid to sparks. Gasoline may also be explosive when it is vaporized, so operation should be done in a well-ventilated place.
Remove and Install muffler after it is fully cold.

● This chapter is on the disassembly and installation of rack, visible parts, exhaust pipe, Muffler and fuel tank.
● Hoses, cables and wiring should be routed properly
● Replace the gasket with a new one after muffler is removed
● After muffler is installed, check if there is any exhaust leakage.

Tightening torque

Muffler Rear Fixing Bolt: 20-25N.m
Muffler Exhaust Pipe Nut: 20-25N.m

Troubleshooting

Loud exhaust noise
● Broken muffler
● Exhaust leakage
Insufficient power
● Distorted muffler
● Exhaust leakage
● Muffler clogged

Center cover, steering wheel

Remove

Remove six bolts 1

Exert upward to separate center cover, steering wheel;

Installation

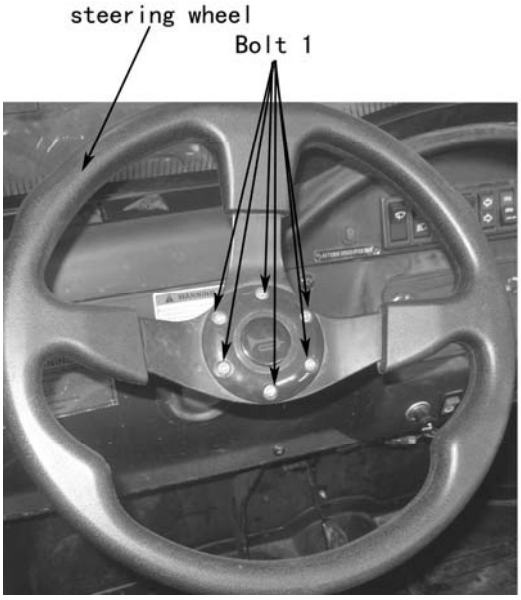
Reverse the removal procedure for Installation

Steering wheel

Remove

Exert upward to separate center cover, steering wheel

Remove steering wheel



Installation

Note

Align the front wheel first, and then ad just steering wheel;

Reverse the removal procedure for Installation

Decorate cover, steering stem

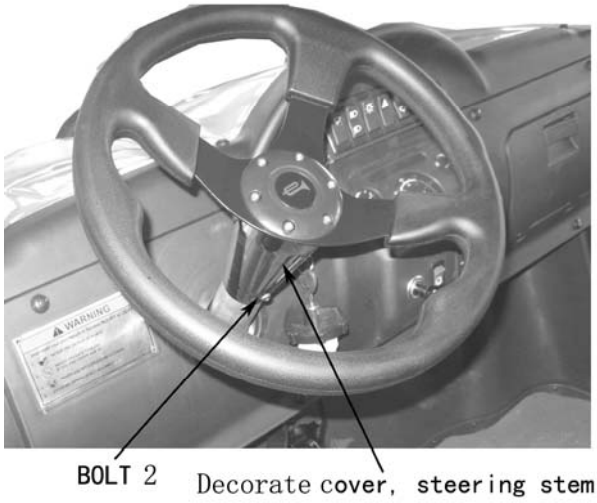
Remove

Remove bolt 2

Remove decorate cover, steering stem

Installation

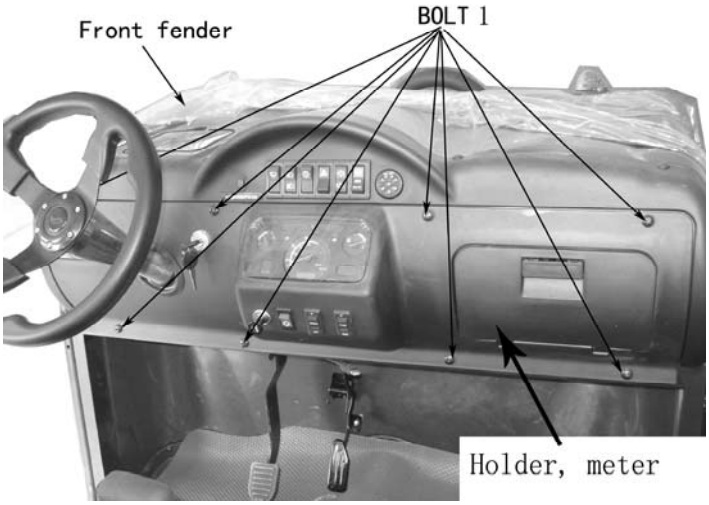
Reverse the removal procedure for Installation



Holder, meter

Remove

Remove eight bolts 1
Loosen all electronic component and plugs in holder, meter.
Remove holder, meter.

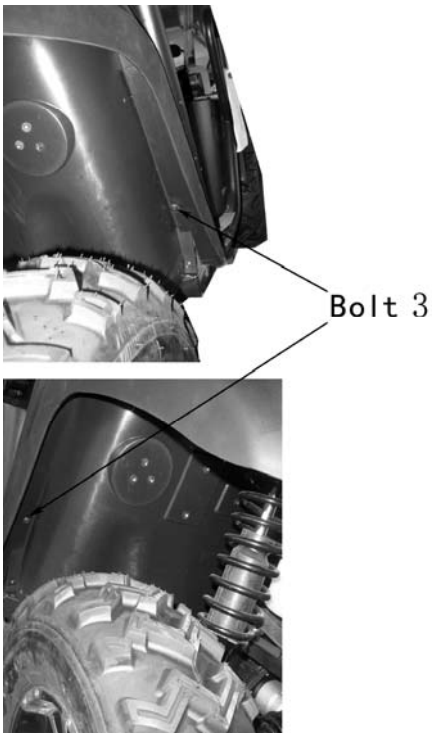


Engine cover

Remove

Remove four bolts 1

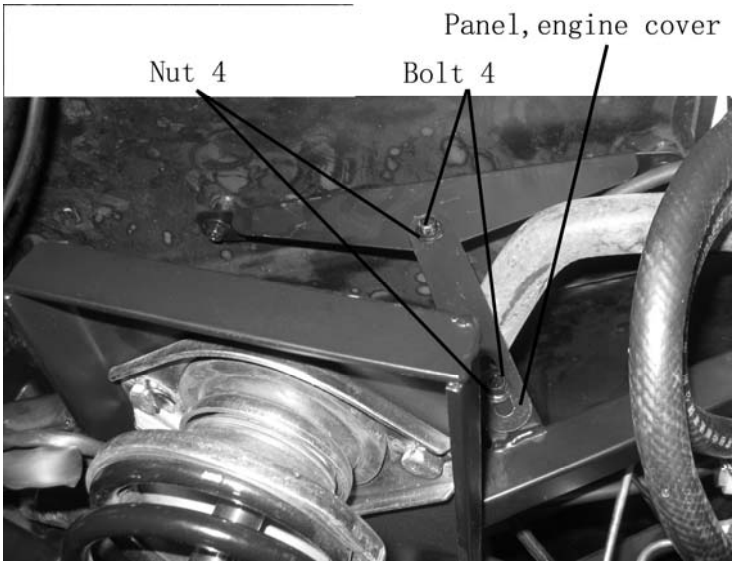
Remove two bolt 3
Loose cables on the engine cover.



Remove two bolts 4

Remove two nuts 4

Remove panel, engine cover (L)

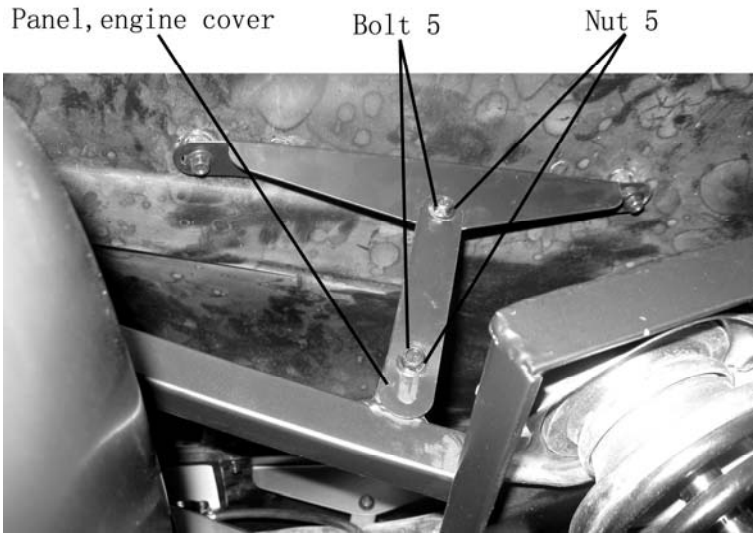


Remove two bolts 4

Remove two nuts 4

Remove panel, engine cover (R)

Remove engine cover



Installation

Reverse the removal procedure for installation

Front side support(LH)

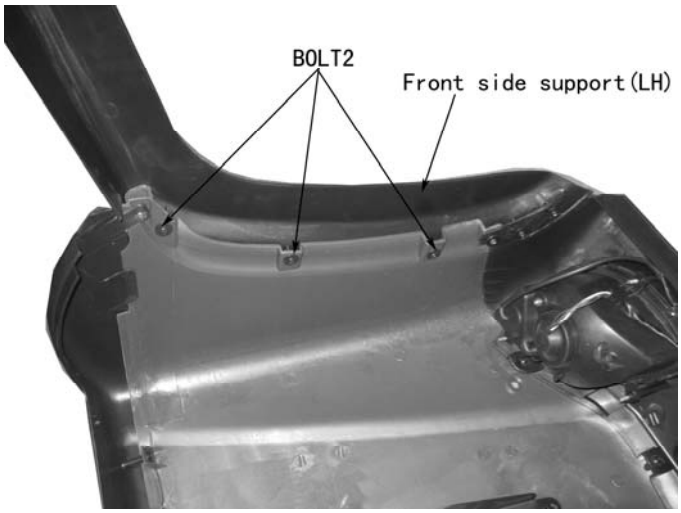
Remove

Remove mount bolts 2;

Remove front side support (LH);

Installation

Reverse the removal procedure for Installation



Front side support (RH)

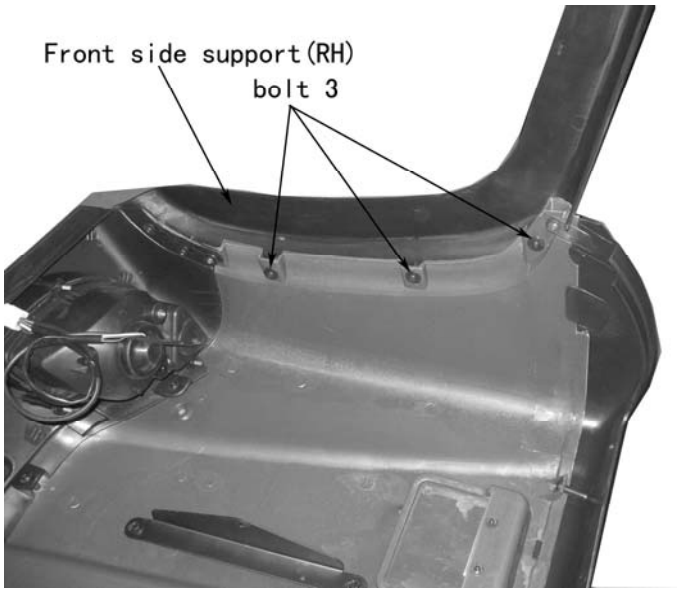
Remove

Remove mount bolts 3;

Remove front side support (RH);

Installation

Reverse the removal procedure for Installation



Front vent cover

Remove

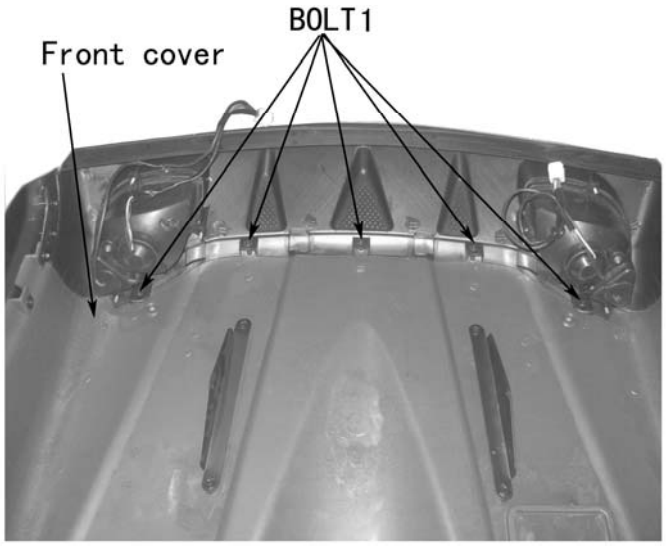
Remove front side support(RH&LH)（→2-5）

Remove nut 1 from front cover.

Remove front vent cover

Installation

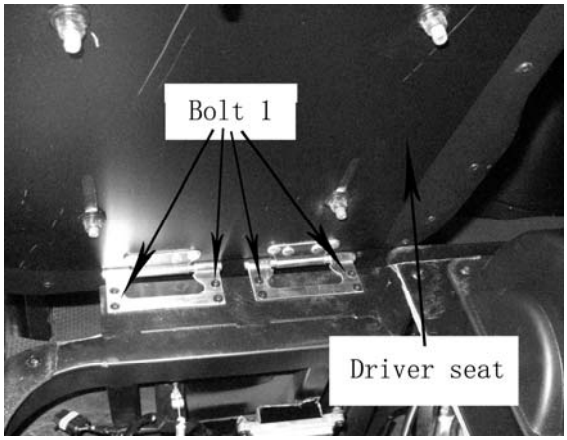
Reverse the removal procedure for Installation



Seat, driver

Remove

Use the latch puller to unlock the seat lock
Remove eight bolts 1
Remove seat, driver



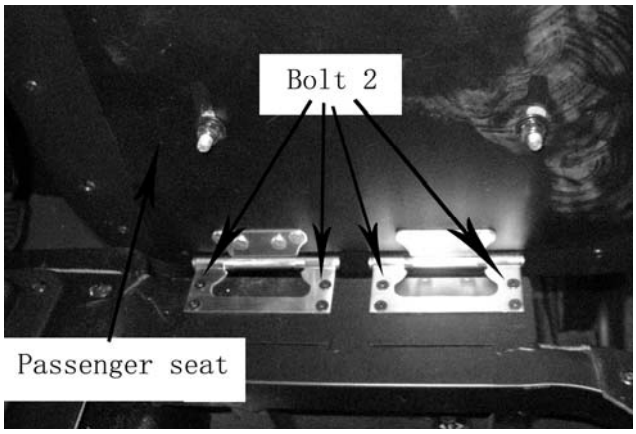
Installation

Reverse the removal procedure for installation

Seat, passenger

Remove

Use the latch puller to unlock the seat lock;
Remove eight bolts 2
Remove seat, passenger



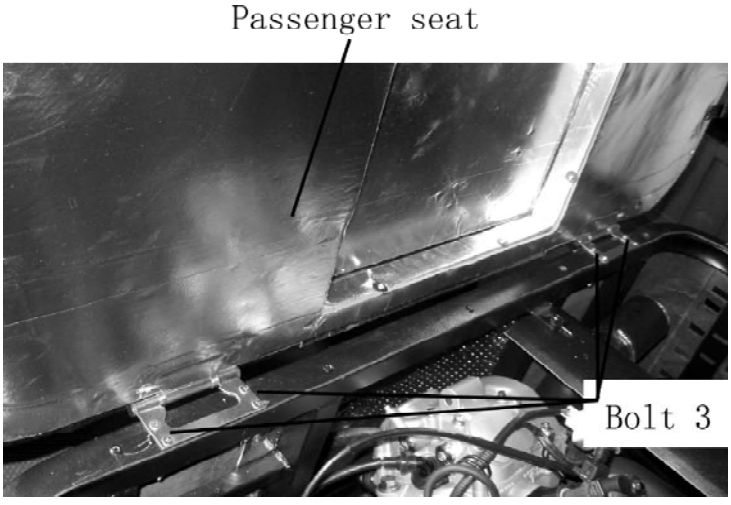
Installation

Reverse the removal procedure for installation

Seat, passenger（500L）

Remove

Use the latch puller to unlock the seat lock;
Remove eight bolts 3
Remove seat, passenger



Installation

Reverse the removal procedure for installation

Gearshift knob

Remove

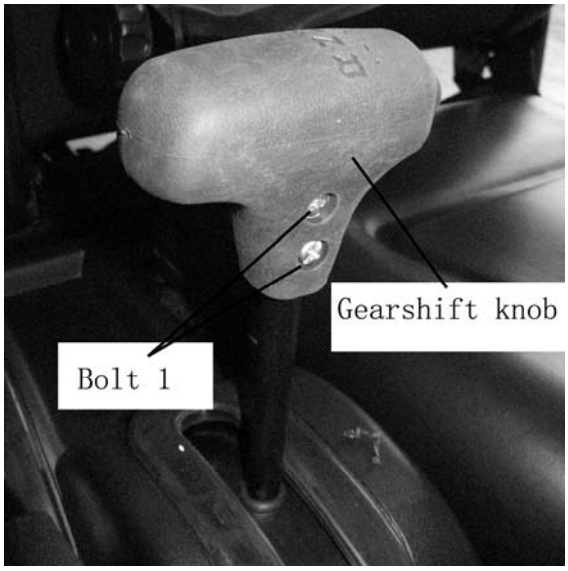
Remove bolt 1
Remove gearshift knob

Installation

Reverse the removal procedure for Installation.

Note

Check the return flexibility of gear limit, and the flexibility of gear shifting.



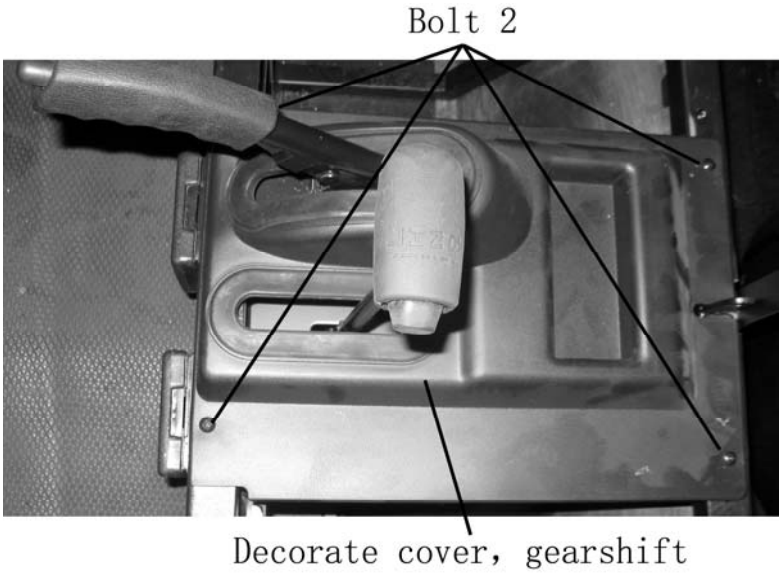
Decorate cover，gearshift

Remove

Remove bolt 2
Remove decorate cover， gearshift.

Installation

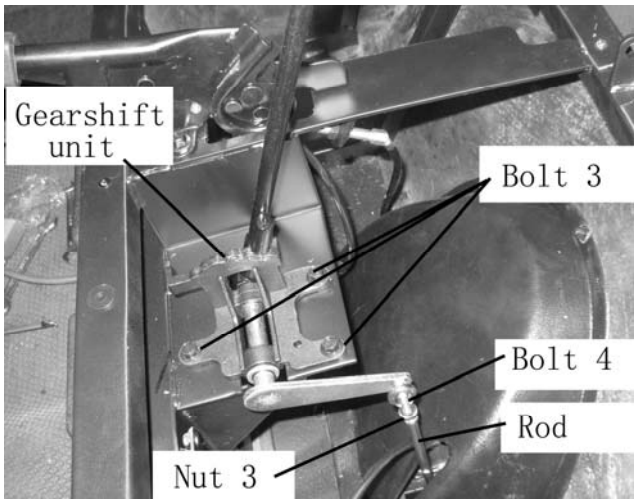
Reverse the removal procedure for Installation.



Gearshift unit

Remove

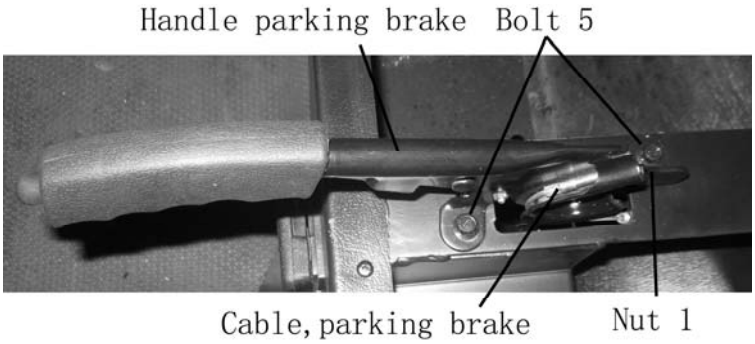
Remove bolt 4
Remove bolt 3
Loosen nut 3
Remove gearshift unit



Handle, parking brake

Remove

Remove nut 1
Loosen cable, parking brake
Remove bolt 5
Remove handle, parking brake.



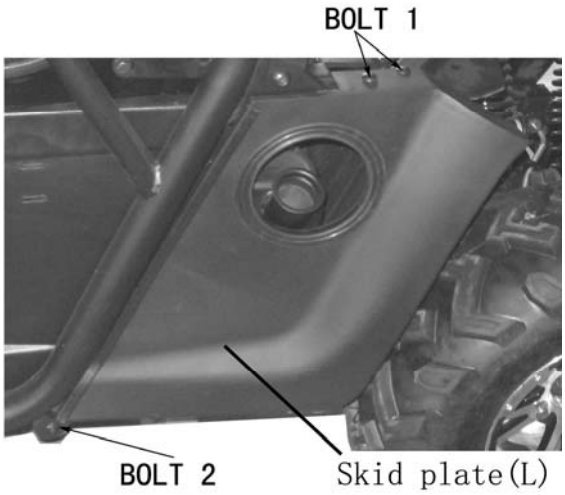
Skid plate (L)

Remove

Remove fuel tank cap.
Remove bolt 1
Remove bolt 2
Remove skid plate (L)

Installation

Reverse the removal procedure for installation



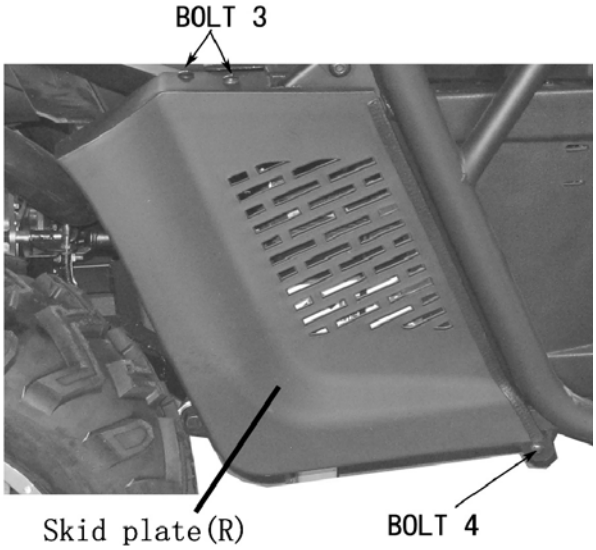
Skid plate (R)

Remove

Remove bolt 3
Remove bolt 4
Remove skid plate (R)

Installation

Reverse the removal procedure for Installation



Rear fender (L)

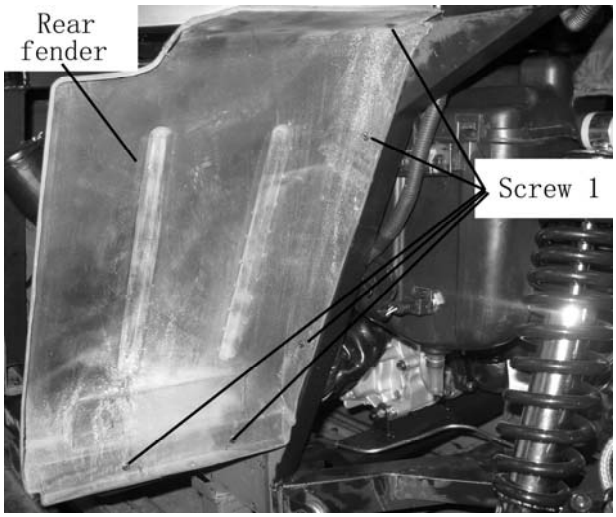
Remove

Remove screw 1

Remove rear fender (L)

Installation

Reverse the removal procedure for installation



Rear fender(R)

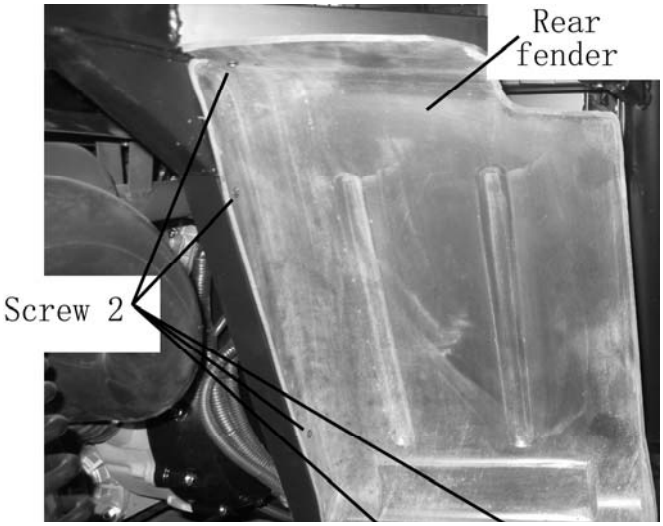
Remove

Remove screw 2

Remove rear fender (R)

Installation

Reverse the removal procedure for Installation



Fender, cargo box（L）

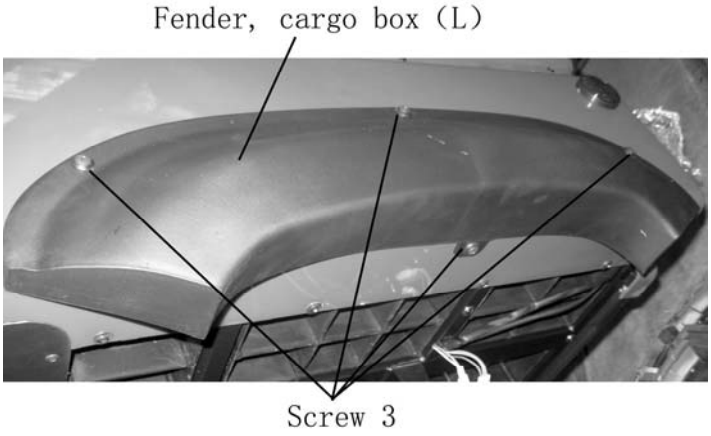
Remove

Remove screw 3

Remove fender, cargo box (L)

Installation

Reverse the removal procedure for Installation



Fender, cargo box（R）

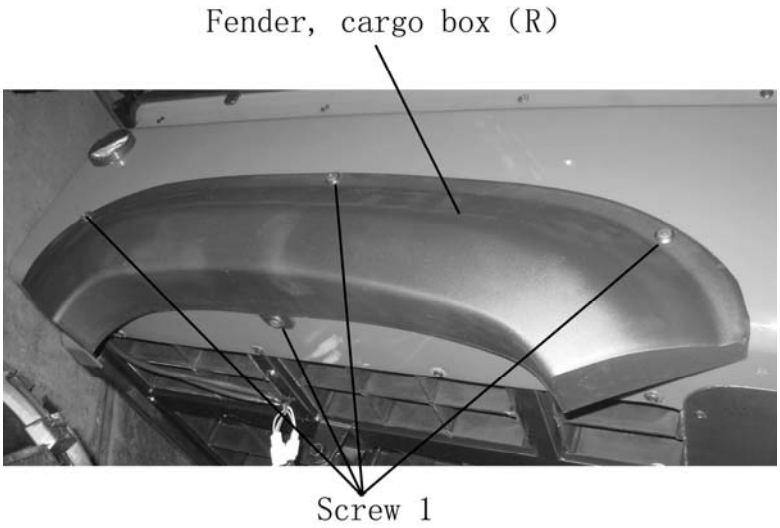
Remove

Remove screw 1

Remove fender, cargo box (R)

Installation

Reverse the removal procedure for Installation



Cargo box

Remove

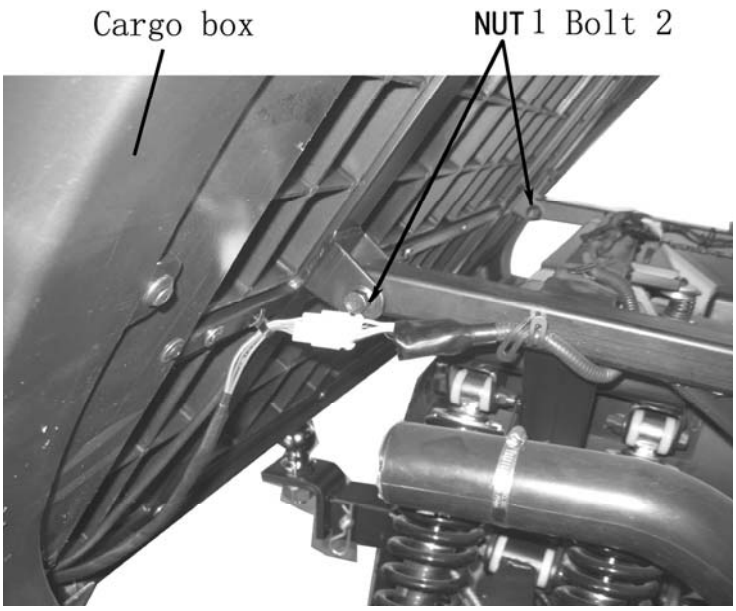
Remove nut 1

Remove bolt 2

Remove cargo box

Installation

Reverse the removal procedure for Installation



Side door (LH)

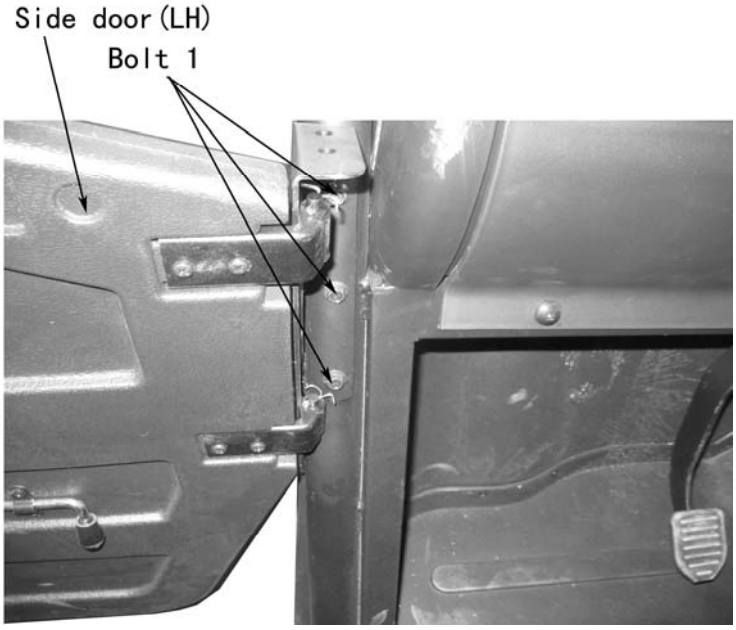
Remove

Remove bolt 1

Remove side door (LH)

Installation

Reverse the removal procedure for installation



Side door (RH)

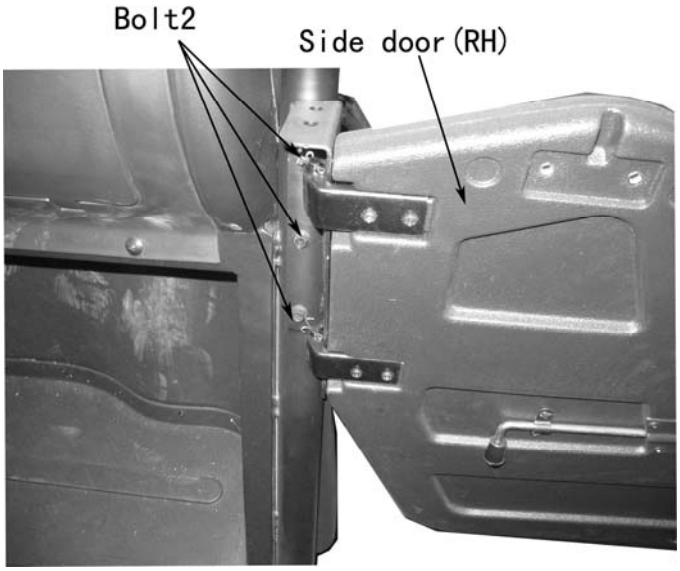
Remove

Remove bolt 2

Remove side door (RH)

Installation

Reverse the removal procedure for Installation



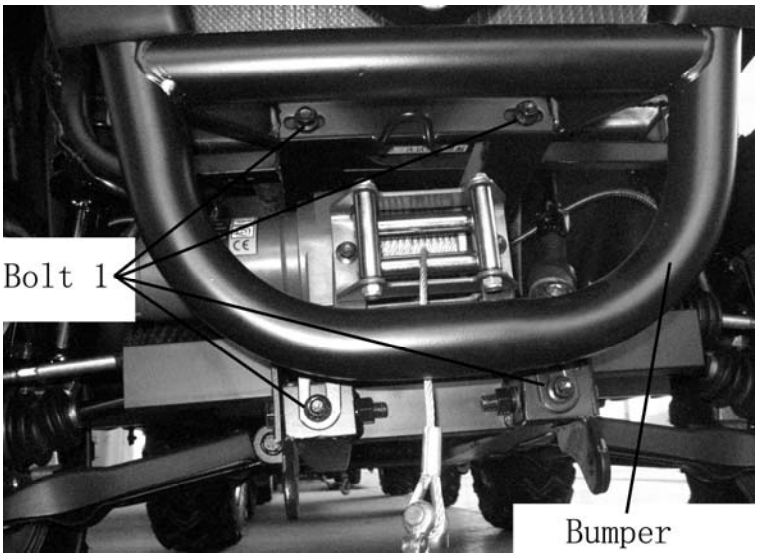
Bumper

Remove

Remove bolt 1
Remove bumper

Installation

Reverse the removal procedure for installation



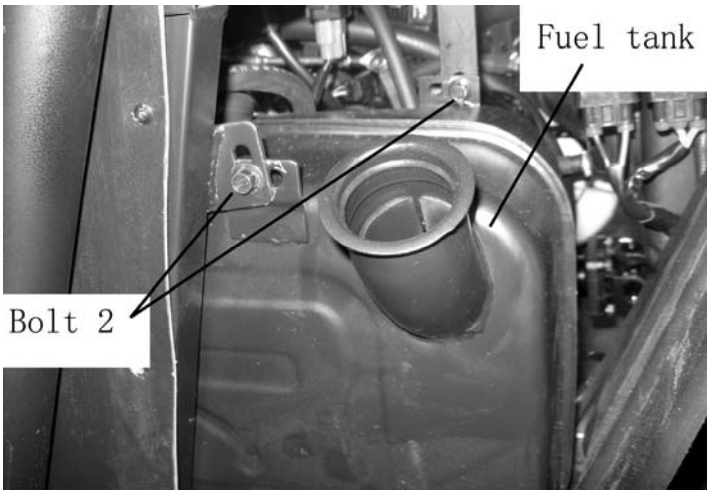
Fuel tank

Remove

Remove skid plate (L) (→2-8)
Loosen fuel pipe
Loosen fuel sensor connector
Remove bolt 2
Remove fuel tank

Installation

Reverse the removal procedure for installation



Headrest, driver

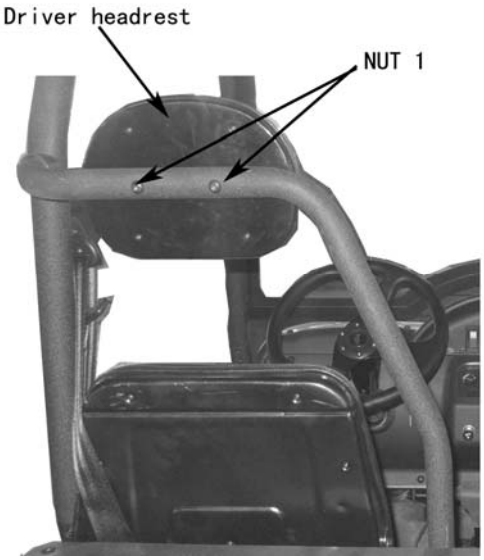
Remove

Remove nut 1

Remove headrest, driver

Installation

Reverse the removal procedure for Installation



Headrest, passenger

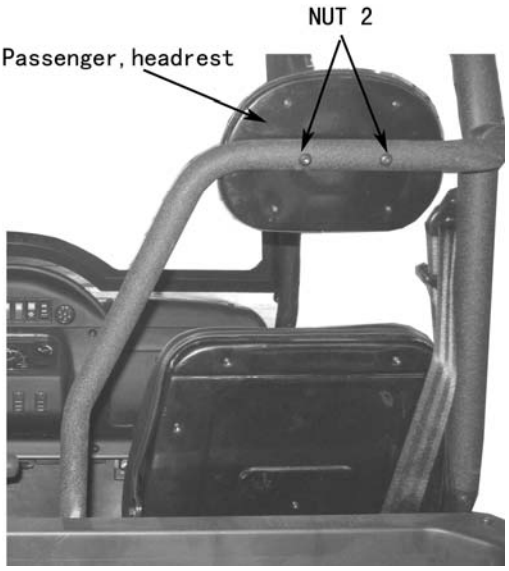
Remove

Remove nut 2

Remove headrest, passenger

Installation

Reverse the removal procedure for Installation



Backrest, passenger (500L/500UEL)

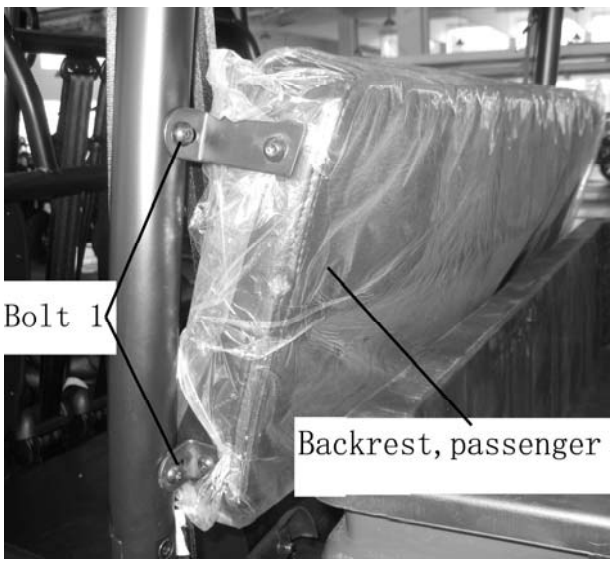
Remove

Remove bolt 1

Remove backrest, passenger

Installation

Reverse the removal procedure for Installation



Safety belt, driver

Remove

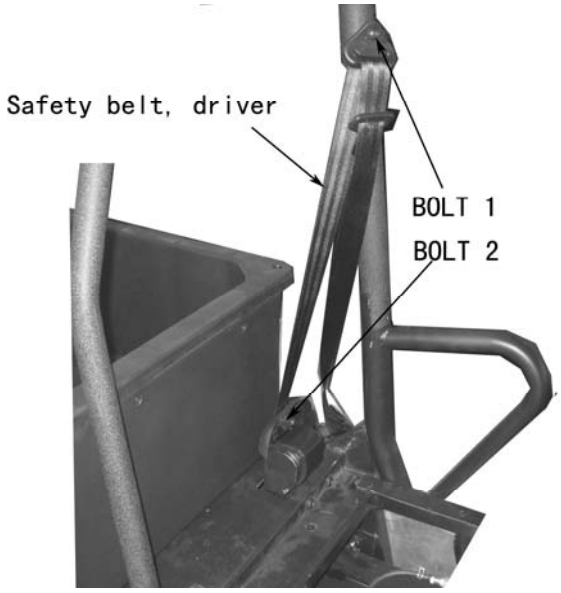
Remove bolt 1

Remove bolt 2

Remove safety belt, driver

Installation

Reverse the removal procedure for Installation



Safety belt, passenger

Remove

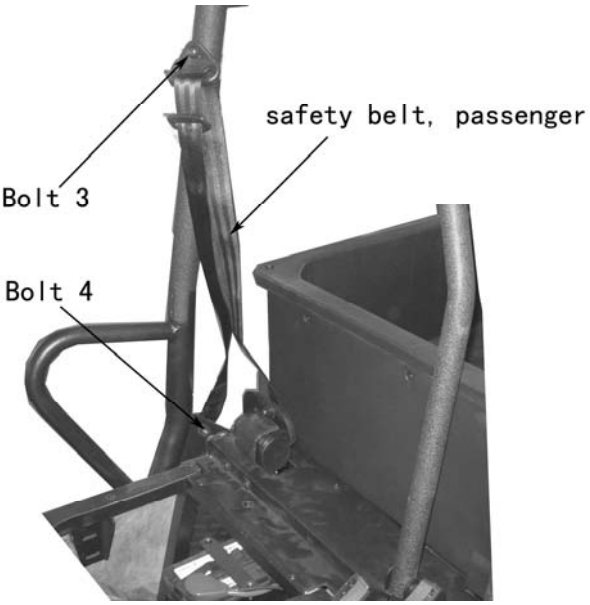
Remove bolt 3

Remove bolt 4

Remove safety belt, passenger

Installation

Reverse the removal procedure for Installation



Safety belt fastener

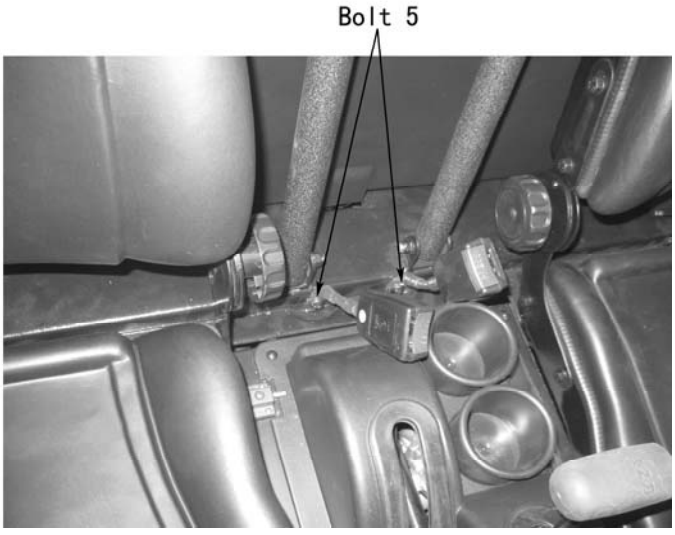
Remove

Remove bolt 5

Remove safety belt fastener

Installation

Reverse the removal procedure for installation



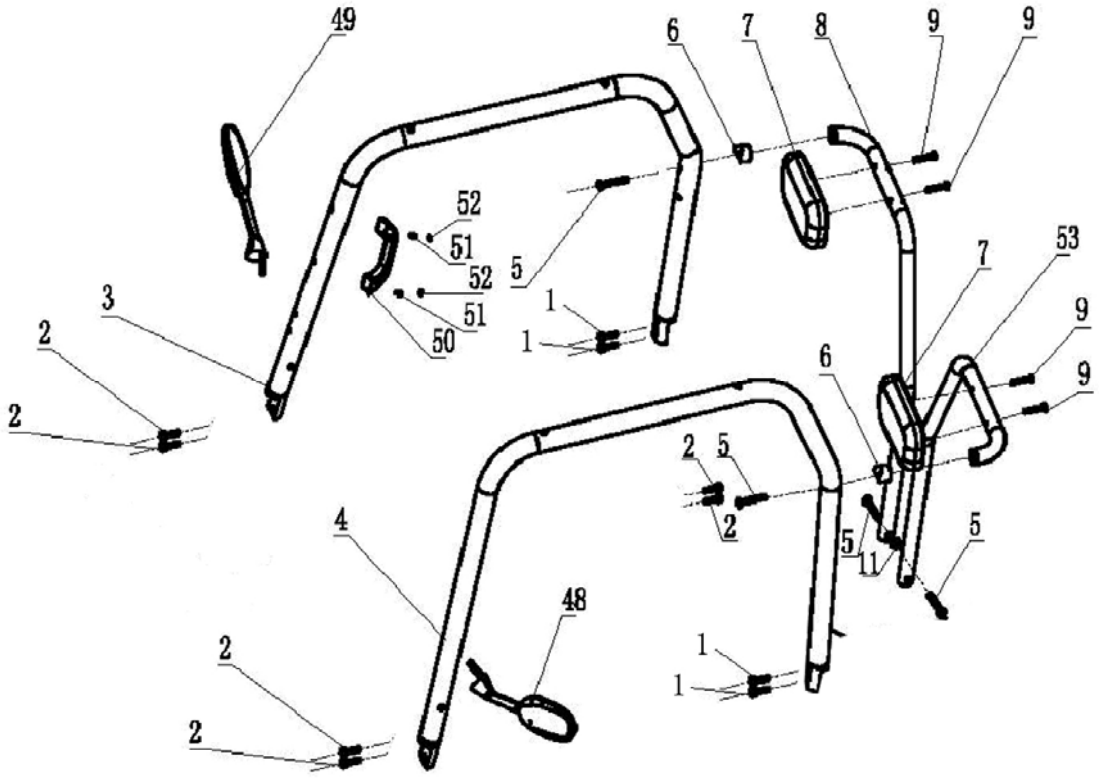
Roll-over bar(500UTV/500UE)

Remove

Remove bolt 1，
Remove bolt 2
Loosen nut 11
Remove bolt 5
Remove roll-over bar

Installation

Reverse the removal procedure for
Installation



Rear mirror(LH)

Remove

Remove rear mirror (L)48

Rear mirror (RH)

Remove

Remove rear mirror (R)49

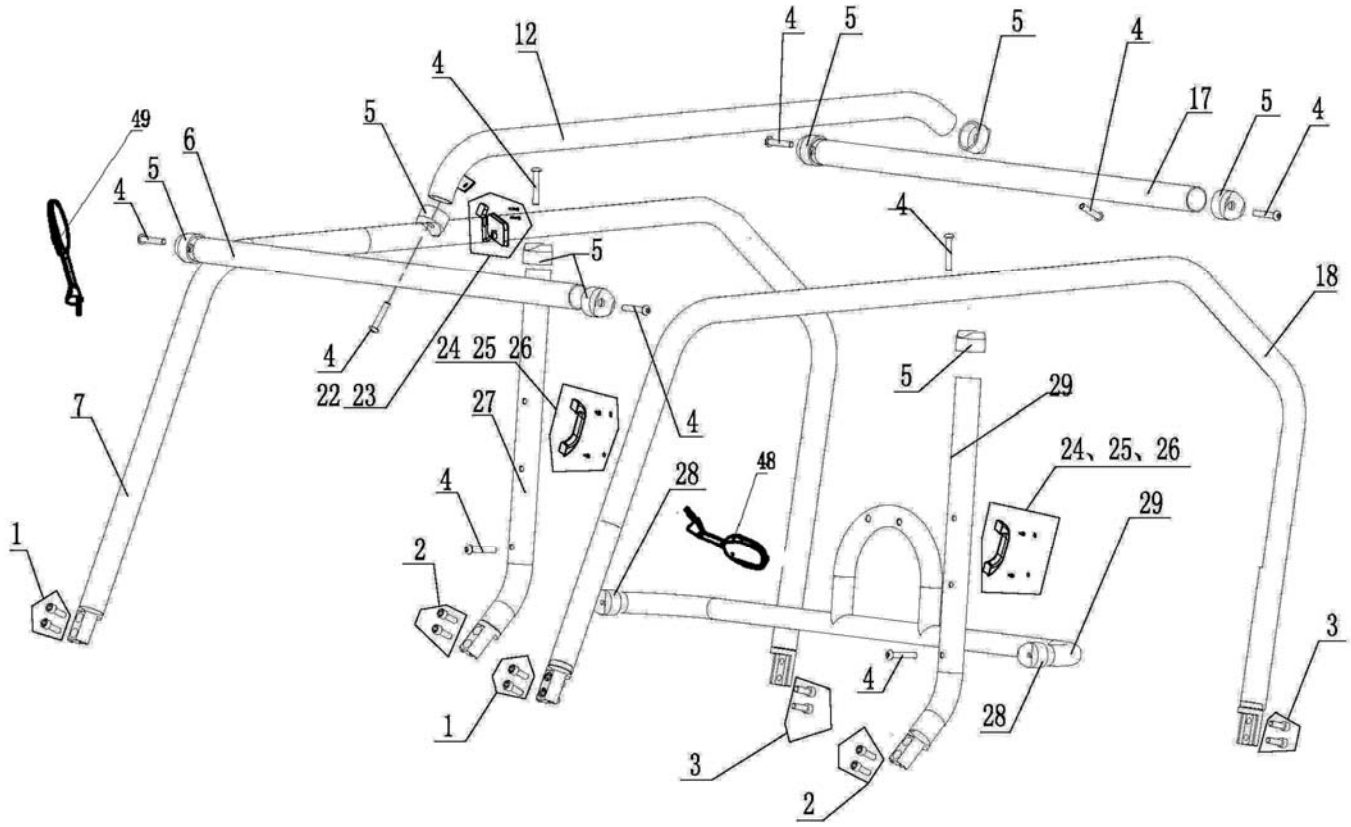
Roll-over bar(500LUTV/500UEL)

Remove

Remove bolt 1，
Remove bolt 2
Remove bolt 3
Remove roll-over bar

Installation

Reverse the removal procedure for
Installation



Rear mirror(LH)

Remove

Remove rear mirror (L)48

Rear mirror (RH)

Remove

Remove rear mirror (R)49

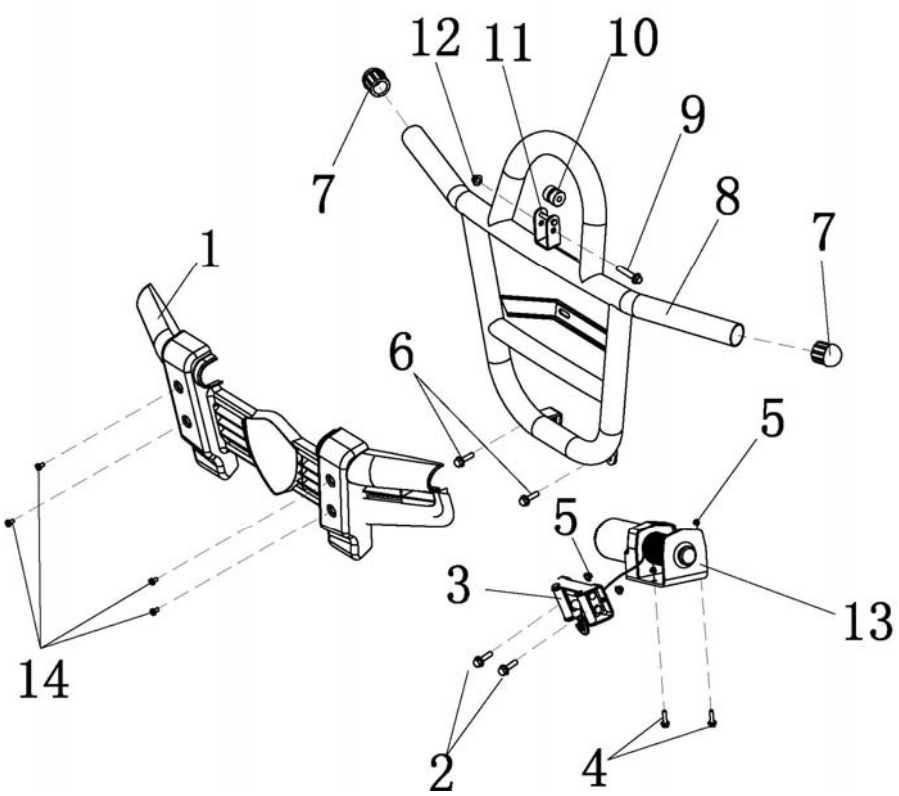
Bumper protector

Remove

Remove nut 14
Remove bumper protector 1

Installation

Reverse the removal procedure for
Installation



Winch cable and motor

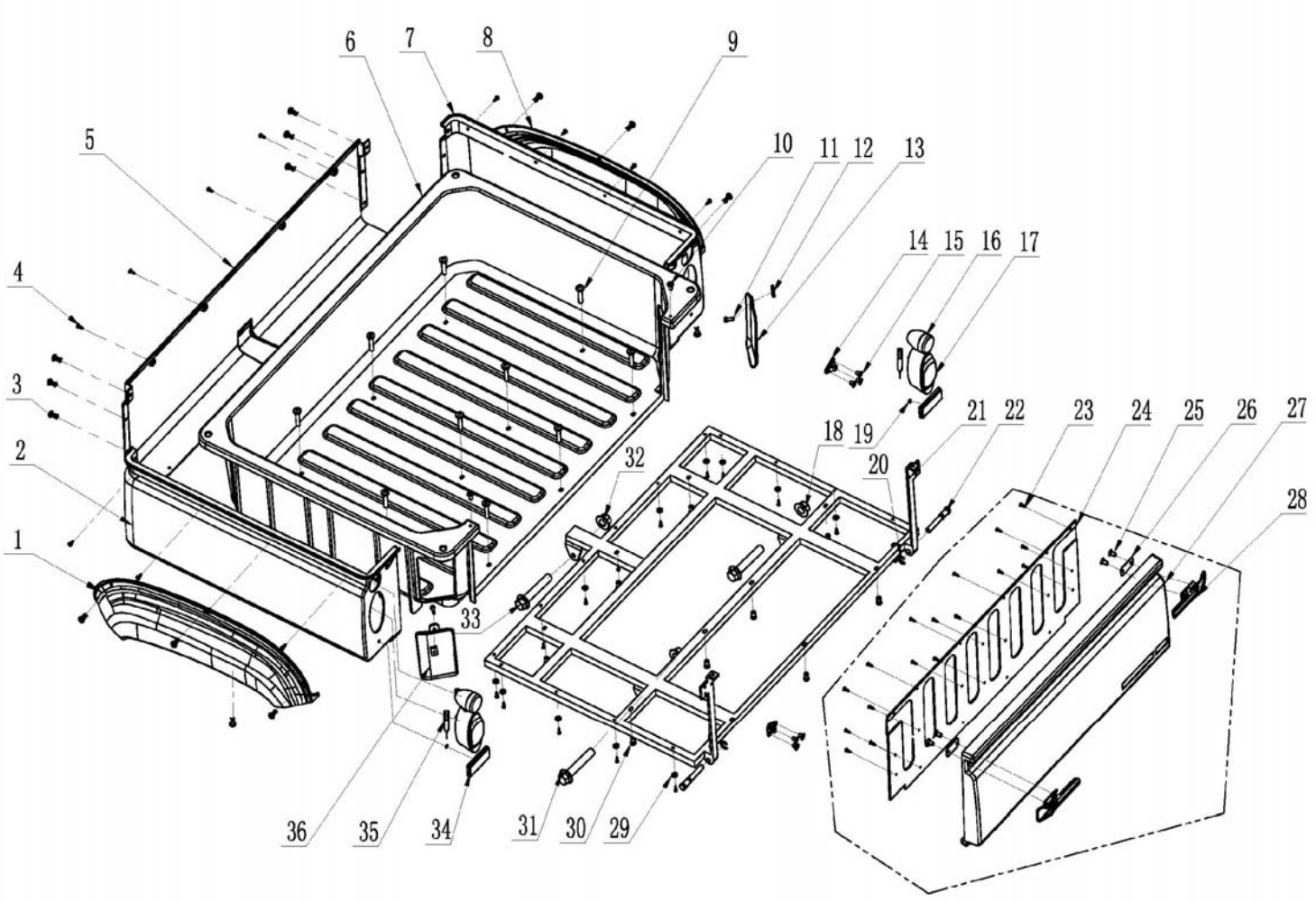
Remove

Remove nut 5 and bolt 4
Remove bolt 2 and nut 5
Remove winch cable and motor 13

Installation

Reverse the removal procedure for
installation

Cargo box



Remove

Remove nut 3

Remove side support (L)1

Installation

Reverse the removal procedure for Installation

Rear side support (R)

Remove

Remove nut 3

Remove rear side support 8

Installation

Reverse the removal procedure for installation

Protector (L), dump box

Remove

Remove bolt 3 and bolt 4

Remove protector (L), cargo box 2

Installation

Reverse the removal procedure for installation

Protector (R), cargo box

Remove

Remove bolt 3 and bolt 4

Remove protector (R), cargo box 7

Installation

Reverse the removal procedure for installation

Bracket, cargo box

Remove

Remove nut, driver 30

Remove bracket, cargo box 21

Installation

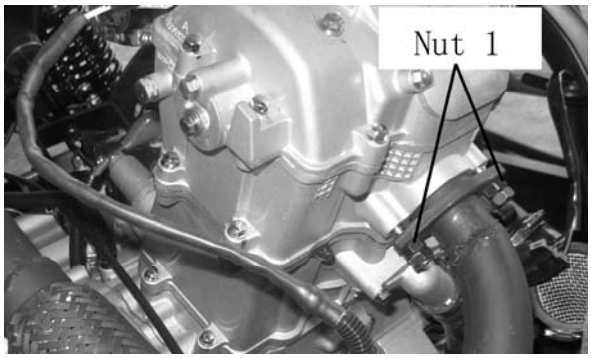
Reverse the removal procedure for installation

Muffler

Caution: Perform disassembly only after the muffler is cooled down.

Remove

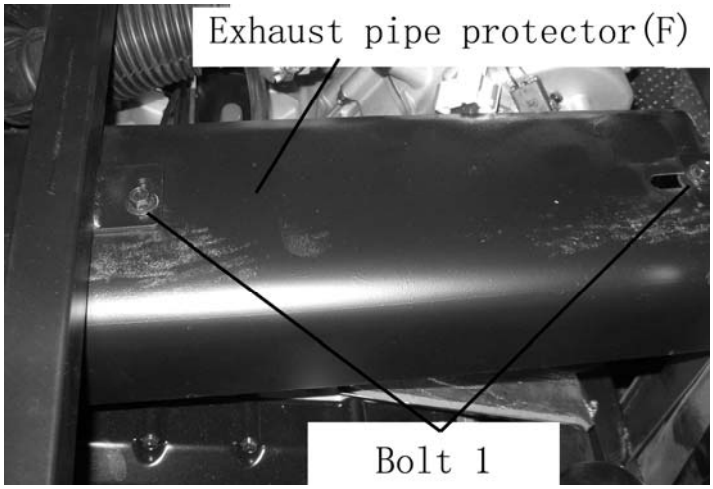
Remove connect nut 1 on muffler pipe elbow



Remove bolt 1

Remove exhaust pipe protector(F)

Caution: Perform disassembly only after the muffler is cooled down.

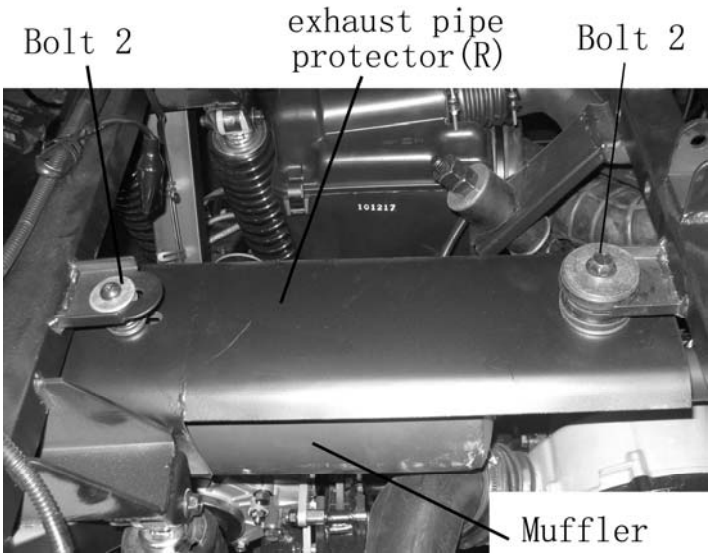


Remove bolt 2

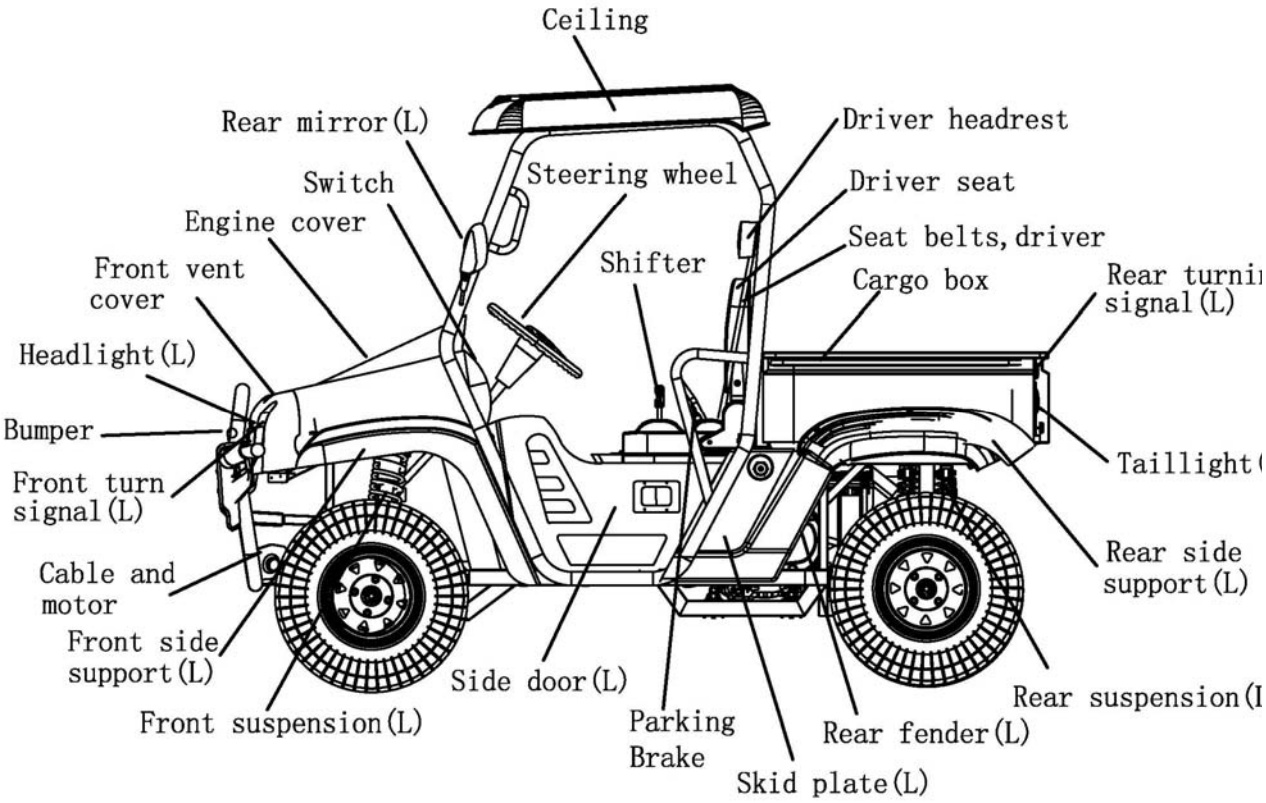
Remove muffler

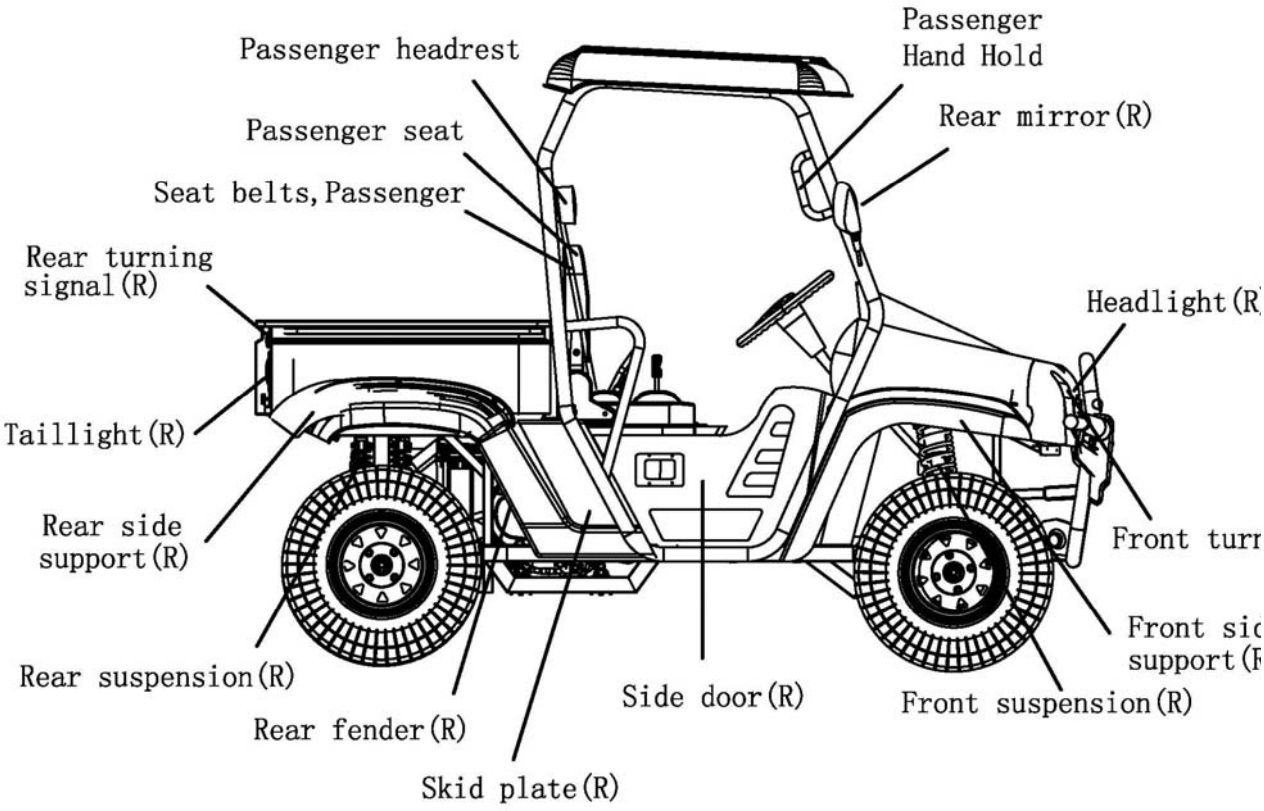
Note:

Replace sealing gasket when installing the muffler.



Description of visible parts





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Overhaul Info

Operation Cautions

Note

- DO NOT keep the engine running for long time in a poorly ventilated or enclosed place because of the harmful components like CO, etc, in the exhaust gas.
- The muffler and engine are still very hot when the engine is just stopped. Careless contact may cause serious burn. Be sure to wear fatigue dress with long sleeves and gloves if the work has to be done after the engine is just stopped
- Gasoline is highly flammable, smoking is strictly forbidden in the work place. Keep alert on the electrical sparks. Besides, vaporized gasoline is highly explosive, so work should be done in a well-ventilated place.
- Be careful that your hands or clothes not get nipped by the turning or movable parts of the driving system.

Note

The vehicle should be parked on hard and level ground.

Replace parts regularly

Parts replacement time is subject to time or kilometers, whichever occurs first.

Regular Maintenance Table

The table below lists the recommended intervals for all the required periodic maintenance work necessary to keep the vehicle at its best performance and economy. Maintenance intervals are expressed in terms of kilometer, miles and hours, whichever occurs first.

Note: More frequent maintenance may be required on vehicles that are used in severe conditions.

Interval / Item	Km / Hours	Initial 250km / Initial 20 hours	Every 500 km / Every 50 hours	Every 1000 km / Every 100 hours	Remarks
Valve clearance		I	—	I	IN： 0.05~0.10 EX： 0.17~0.22
Idle Speed		I	I	—	1300±100r/min 1400±100r/min(EFI)
Spark plug		I	—	I	No carbon deposit, Gap：0.8~0.9mm
		R(Every :6000km)			
Air Filter		—	I	C	R(every :20000km)
Fuel Hose, carburetor		—	—	I	
Clutch		—	—	I	R(every: 4-year)
Drive Belt		—	I	—	
Oil Filter		R	—	R	
Oil change		R	—	R	
Coolant Level		I	I	—	
Water Hose & Pipes		I	—	I	
Coolant		R(every: 2-year)			

I – Check and adjust, or replace if necessary

R – Replace

C – Clean

Inspection & Maintenance ○: Interval

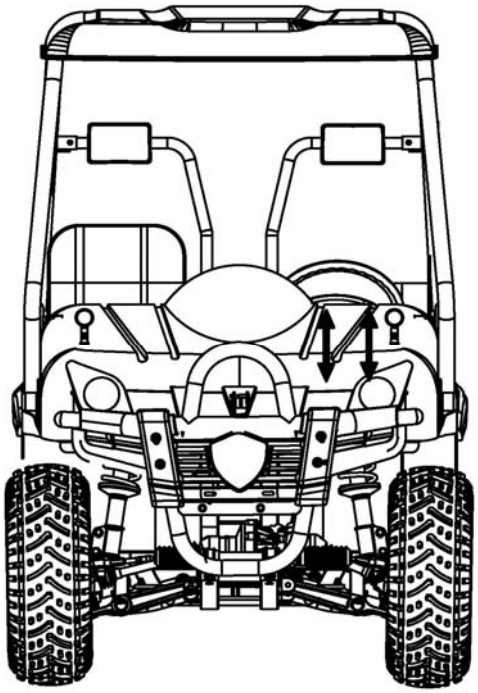
Check Item			Interval			Standard
Part		Item	Daily	1/2 Year	Annual	
Steering System	Steering wheel	Operation agility	○		○	
	Steering System	Damage	○		○	
		Installation condition of steering system	○		○	
		Sway of ball stud	○		○	
Brake System	Brake pedal	Free play	○	○	○	Pedal: rear end 0mm
		Brake Efficiency	○	○	○	
	Connecting rod, oil pipe & Hose	Looseness, Slack and damage	○		○	
	Hydraulic brake and brake disc	Front and rear brake fluid level	○	○	○	Brake fluid should be above LOWER limit
		Brake disc damage and wear	○	○	○	Replace when the thickness of front brake disc is less than 16.5mm, rear brake less than 16.5mm
Driving System	wheel	Tire pressure	○	○	○	Front tire : 145kPa (21±1PSI) Rear tire : 193kPa (28±1PSI)
		Chap and damage	○		○	No wear indication on the surface of tire (the remained depth of groove should not be less than 3mm)
		Groove depth and abnormal wear	○		○	
		Loosened wheel nut and axle	○	○	○	
		Sway of front wheel bearing	○		○	
		Sway of rear wheel bearing	○		○	
Buffer System	Suspension arm	Sway of joint parts, rocker arm damage	○		○	
	Shock absorber	Oil leakage and damage	○		○	
		Function			○	
Drive-Train system	Front axle	Transmission, lubrication`	○		○	
	Rear axle	Transmission, lubrication	○		○	
	Gear box	Transmission, lubrication	○		○	

Check Item			Intervals			Standard
Part		Item	Daily	1/2 year	Annual	
Drive Train	Final shaft (Drive shaft)	Looseness of joint parts	○	○	○	
		Sway of Spline			○	
Electrical System	Ignition Device	Spark plug		○	○	
		Ignition timing		○	○	
	Battery	Terminal Joint			○	
	Wiring	Looseness and damage of joints			○	
Engine	Fuel device	Fuel leakage		○	○	
		Throttle			○	
	Cooling system	Coolant level	○	○	○	
		Coolant leakage			○	

Check Item		Intervals			Standard
Part	Item	Daily	1/2 year	Annual	
Lighting device and turning indicators	Function	○	○	○	
Alarm and lock device	Function			○	
Instruments	Function			○	
Exhaust pipe and muffler	Looseness or damage caused by improper installation			○	
	Function of muffler			○	
Frame	Looseness and/or damage			○	
Others	Lubrication & grease of frame parts			○	
Abnormal parts which can be determined when driving	Make sure if there is any abnormal with relative parts.	○			

Steering Stem

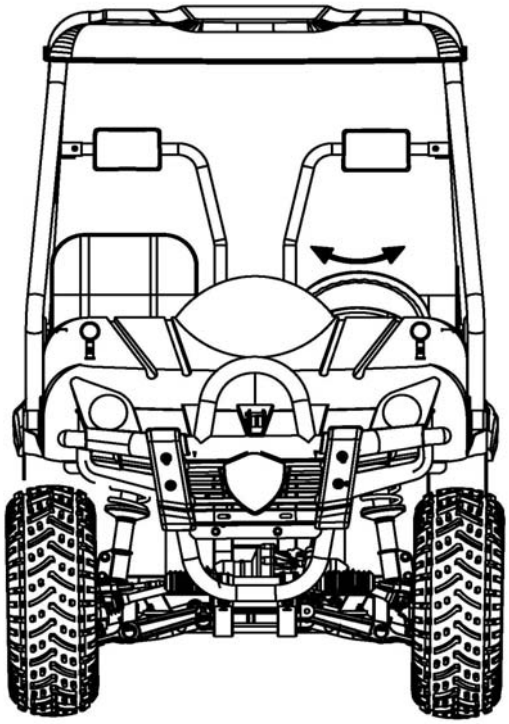
Park the vehicle on level place, hold steering wheel, and shake in the direction as illustrated on the right and see if there is any sway



In case of any sway, check if it is the problem of the steering stem or other parts and then do the maintenance accordingly.

In case of sway of the steering stem, tighten the locknut or disassemble the steering stem for further check.

Park the vehicle on level place, slowly turn the steering wheel left and right to see if it can turn freely.

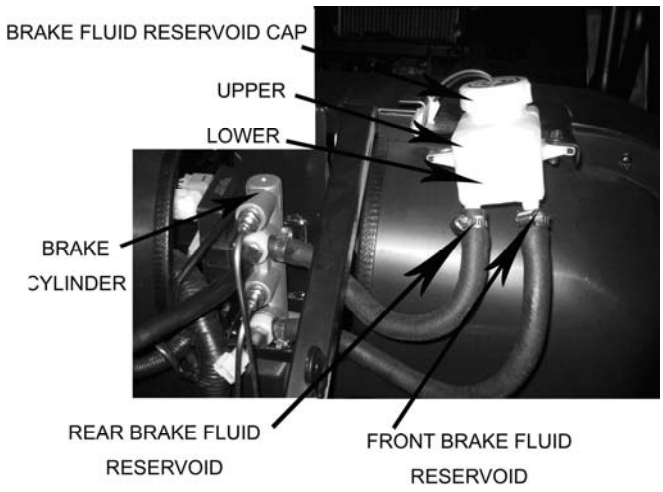


In case there is any hindrance, check if there is any interference. If no, check the steering tie-rod end, and check if the steering stem bearing is damaged

Note:
Make sure the steering can be operated freely.
An accident may occur if the steering wheel is out of control.

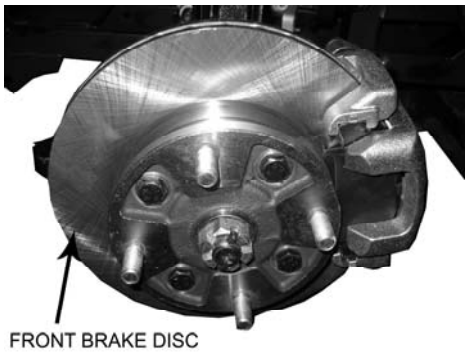
Master Cylinder

Fluid level Check the brake fluid level When the brake fluid level is near to the lower limit line, check master cylinder, brake hoses and joints for leakage.
Remove fluid reservoir cap.
add DOT3 or DOT4 brake liquid till the upper limit line.
Do not mix with dust or water when adding brake fluid.
Use only the recommended of brake fluid to avoid chemical reaction.
Brake fluid may cause damages to the surface of the plastic and rubber parts.
Keep the fluid away from these parts.
Slightly turn the steering wheel left and right till the master cylinder is in horizontal, then remove the fluid reservoir cap.



Brake Disc, Brake Pad

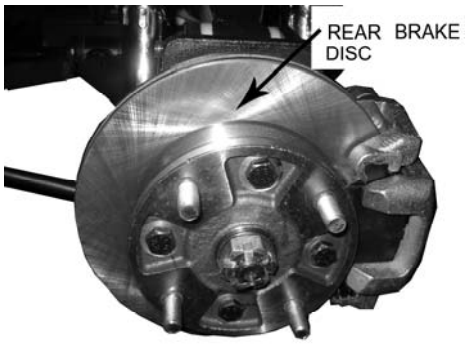
< Wear of brake pad>
Check the brake pad wears from the mark as indicated.
Replace the brake pad if the wear has reached position of wear limit trough.



Note

The brake pad must be replaced with a whole set.

Checking and replacing the brake disc
Front brake disc thickness: ≤16 mm →Replace
Rear brake disc: ≤16 mm →Replace
Min. limited thickness of the front brake disc:16mm
Min. limited thickness of the rear brake disc:16mm



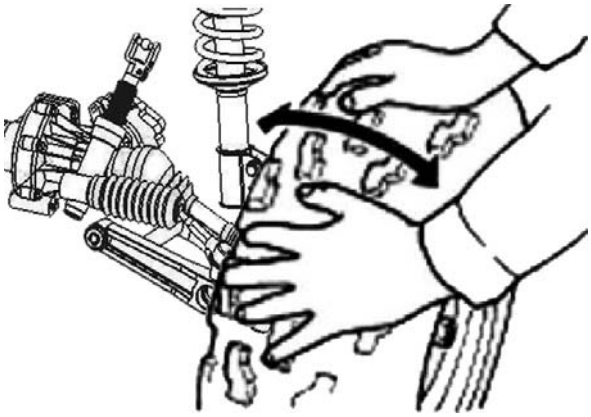
Change the Brake Fluid

< Changing Brake Fluid>

Change the brake fluid once every year.

Wheels

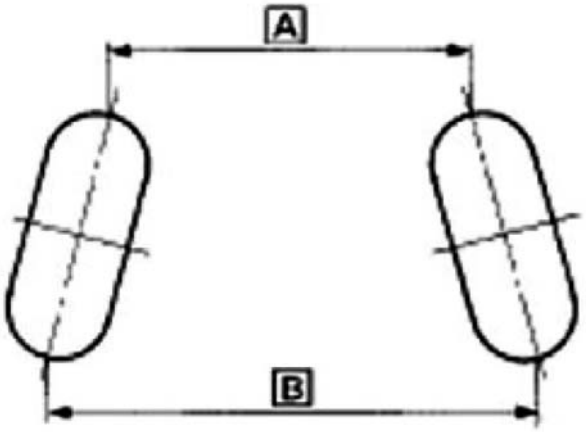
Lift front wheel on level place, and make sure there is no loading on the wheels.
Shake the front wheel left and right to check whether the joint of front wheel is tightened and check whether it sways.



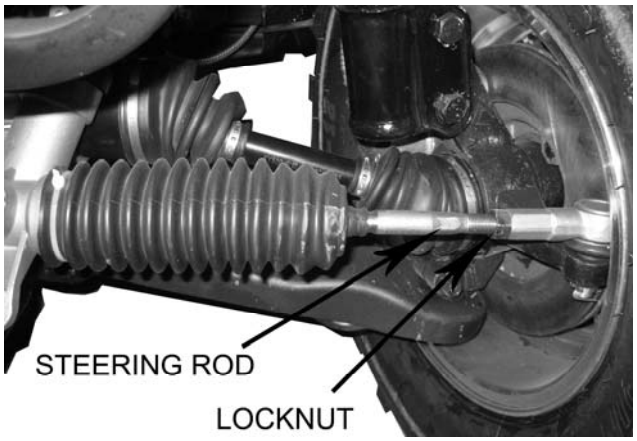
Not tighten enough ? Tighten it sway: Replace the rocker arm

Front Toe-in size

Park the vehicle on level place, measure the front toe-in
Toe-in: B-A=0 ~ 10mm



Toe-in out of the range , Adjust the locknut of tie-rod

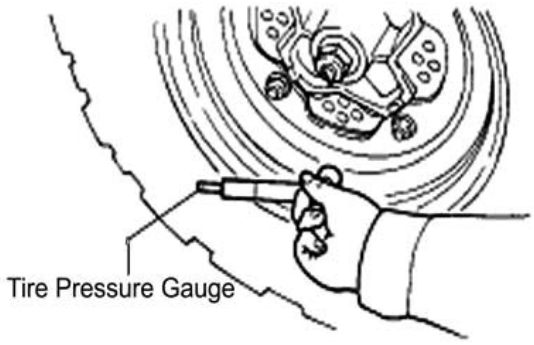


Note:

After the toe-in has been adjusted, slowly run the vehicle to check whether the direction of vehicle can be controlled by steering wheel.

Tire pressure

Check the pressure of the tires with a pressure gauge.



Note

Check the tire pressure after tires are cooled. Driving under improper tire pressure will reduce the comfort of operation and riding, and may cause deflected wear of the tires.

Specified pressure /tire

	Front wheel	Rear wheel
Pressure	145kPa （21±1PSI）	193kPa （28±1PSI）
Tires sizes	25×8-12	25×10-12
	205/80-12	255/65-12

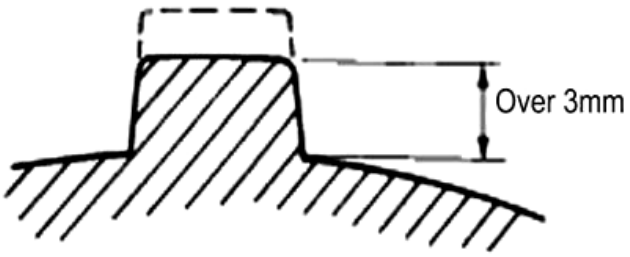
Tire Tread

Check the tire tread.

Tread Height: if < 3mm, then Replace with new tires

Note:

When the tread height is less than 3mm, the tire should be replaced immediately.



Wheel Nut and Wheel Axle

Check front and rear wheel axle nuts for looseness

Loosened axle nuts

Tighten

Tightening Torque:

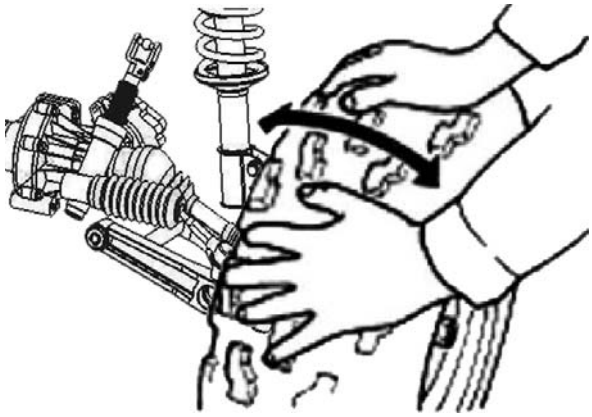
Front wheel axle nut:

180-200N.m (18.3kgf.m-20.3kgf.m)

Rear wheel axle nut:

180-200N.m (18.3kgf.m-20.3kgf.m)

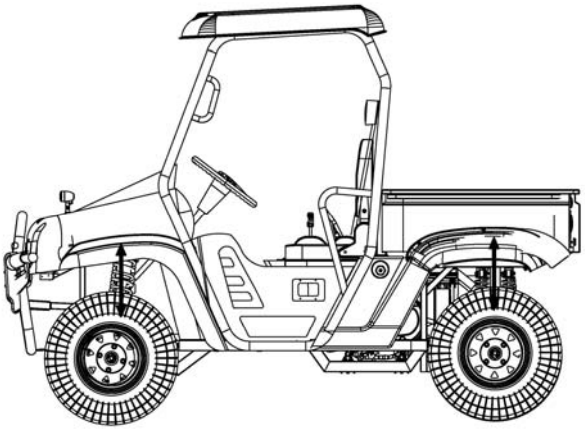
Sway of Wheel Bearing



Lift the front wheel

Make sure there is loading on the vehicle shake the wheel in axial direction for any sway In case of any sway, disassemble the front wheel and check the bearing

Suspension System

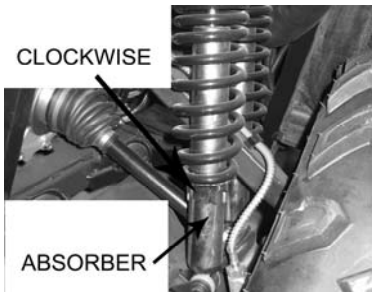


Park the vehicle on lever place, press the vehicle Several times up and down as illustrated on the right.

In case of any rocking or abnormal noise, check whether there is any oil leakage from absorbers, or any damage or looseness of tightening parts.

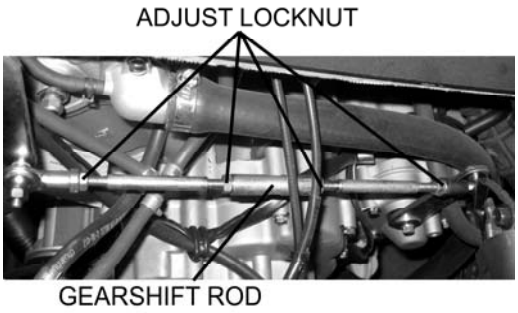
Adjusting the Absorber

Use special tools to adjust the length of absorber according to loading requirement Turn clockwise to adjust from high to low.



Gear Shifting

Shift the gear to check for flexibility and gear engagement Adjust the gearshift rod if necessary Release the lock nut to adjust the length of gearshift rod



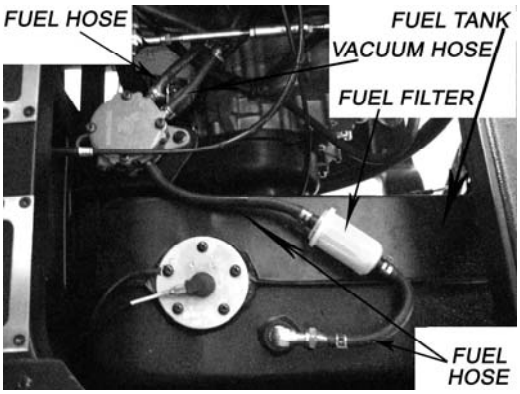
Carburetor:

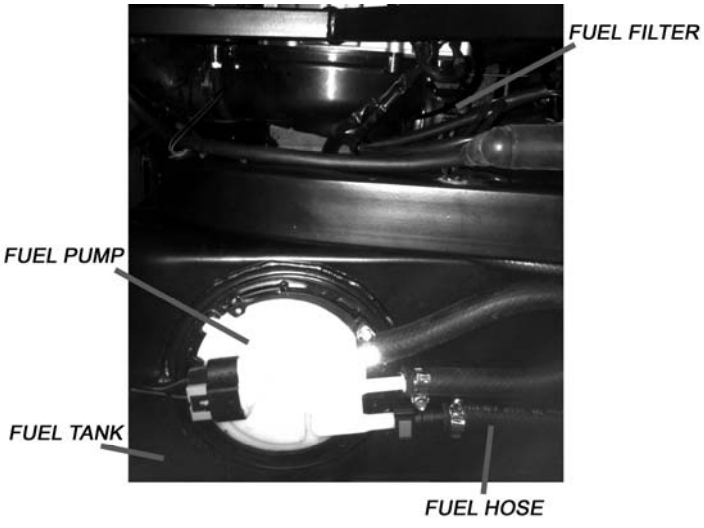
Fuel Device

Status of the fuel system

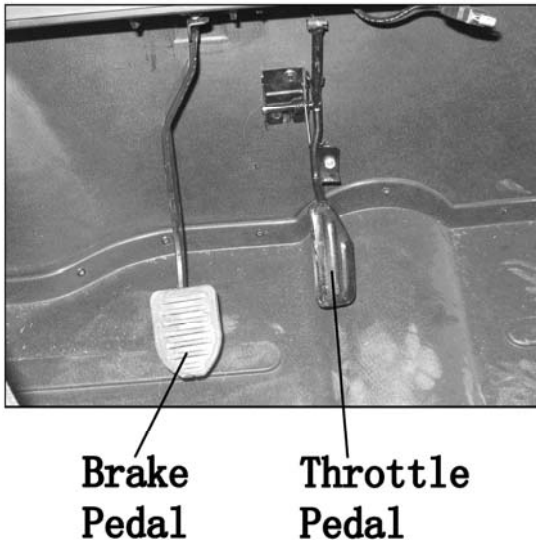
Remove the seat (→2-6)

Check the fuel hose for any aging or damage. Aged or damaged fuel hose: Replace Check if there is cracks or bending with the vacuum tube. Cracked or bended vacuum tube: Replace





Throttle Pedal Check

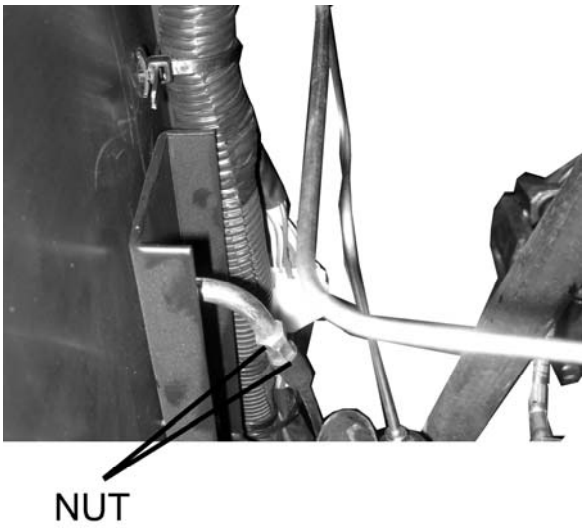


Check the free play of throttle pedal
Free play: 1.5-3mm

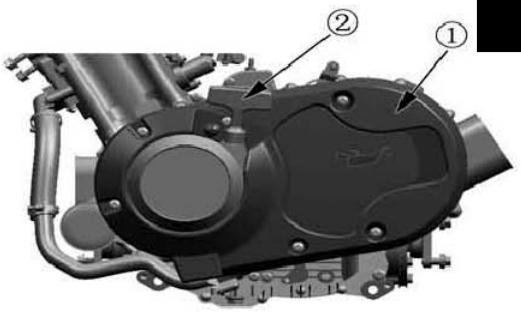
If out of range, then adjust
Loosen locknut of throttle cable turn the regulator and adjust free play of throttle pedal

After adjusting, tighten locknuts and install throttle cable sleeve.

Replace with a new throttle cable if the specified free play could not be acquired by adjusting the regulator or if there is still stickiness with the throttle.

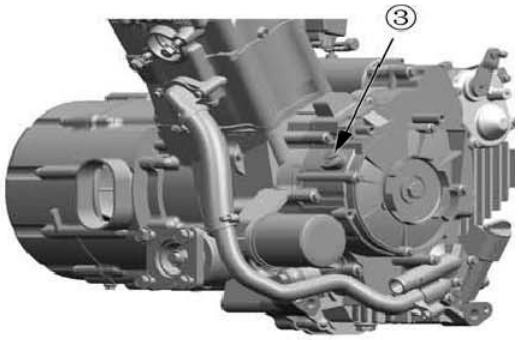


This section describes the maintenance procedures for each item mentioned in the Periodic Maintenance Chart.



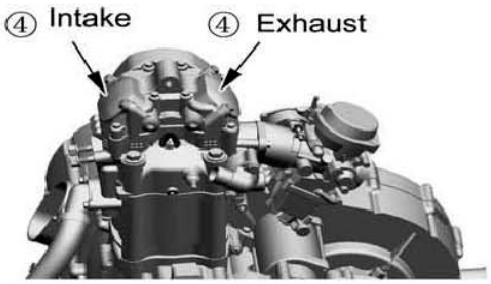
VALVE CLEARANCE

Inspect initially at 20-hour break-in and every 40 hours or every 1000km thereafter. Inspect the clearance after removing cylinder head.



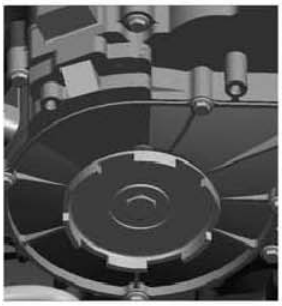
Excessive valve clearance results in valve noise and insufficient valve clearance results in valve damage and reduced power.
Check the valve clearance at the period indicated above and adjust the valve clearance to specification, if necessary.

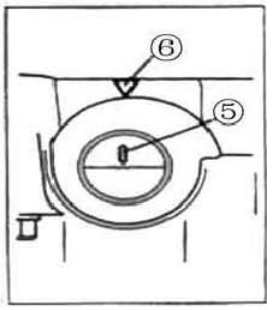
Remove cover plate , recoil starter②
Remove inspection cap ③on left crankcase.
Remove 2 valve adjusting cover ④
Turn the crankshaft until the line⑤ of T.D.C. on rotor is aligned with mark⑥ of inspection hole on left crankcase.



Insert feeler gauge to check the clearance between the valve stem end and the adjust bolt on the rocker arm.

Valve Clearance (When cold)
IN: 0.05-0.10mm EX: 0.17-0.22mm





Note:
- The valve clearance must be adjusted when the engine is cold.
- Adjust the valve clearance when the piston is at the Top Dead Center (T.D.C.) on the compression stroke.

If the clearance is incorrect, bring it into the specified range using the special tool.

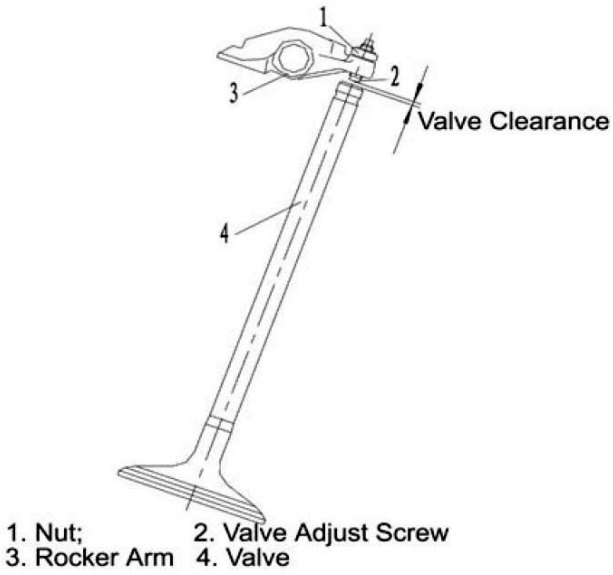
Loosen valve adjust bolt and nut, insert a feeler gauge between the valve stem end and valve adjusting bolt, tighten valve adjust bolt, make sure it slightly contacts the feeler gauge, tighten bolt and nut.

Take out the feeler gauge, measure the clearance.
If the clearance is incorrect, repeat the above steps until the proper clearance is obtained.Locknut: 10 N.m

Caution:
Securely tighten the locknut after completing adjustment

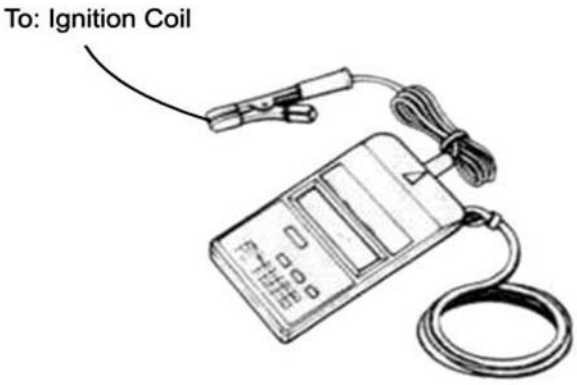
Install:
2 valve adjusting cover;
Inspection cap;
Recoil starter;
Cover plate;
Apply a small quantity of THREAD LOCKER to recoil starter fixing bolts.

Tools:
Valve adjuster
Feeler gauge
Material:
Thread Locker



ENGINE IDLE SPEED

Inspect initially at 20 hours run-in and every 40 hours or 1000km thereafter.



Start the engine and warm it up for several minutes, measure engine speed with a tachometer. Set the engine idle speed between 1200~1400 r/min by turning the throttle stop screw of carburetor.
Engine idle speed: 1300r/min±100r/min

Note:
Make this adjustment when the engine is hot

Tool: Tachometer

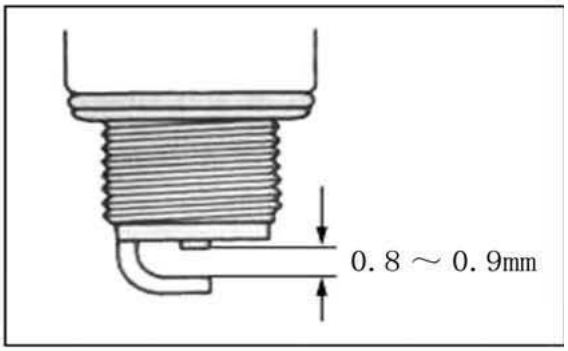
SPARK PLUG

Inspect initially at 20 hours run-in and every 80 hours or 2000km thereafter. Replace every 6000km.

Remove the spark plug with a special tool
Specification: DER7EA-9(NGK)

If the electrode is extremely worn or burnt, or spark plug

has a broken insulator, damaged thread, etc, replace the spark plug with a new one.



SPARK PLUG GAP

Measure the spark plug gap with a feeler gauge.

Out of specification: → Adjust

Spark plug gap: 0.8-0.9mm

> Caution:
> Check the thread size and reach when replacing the spark plug. If the reach is too short, carbon will be deposited on the screw portion of the spark plug hole and engine damage may result.

Installation:

> Caution:
> To avoid damaging the cylinder head threads; first, tighten the spark plug with fingers, and then tighten it to the specified torque using the spark plug wrench.

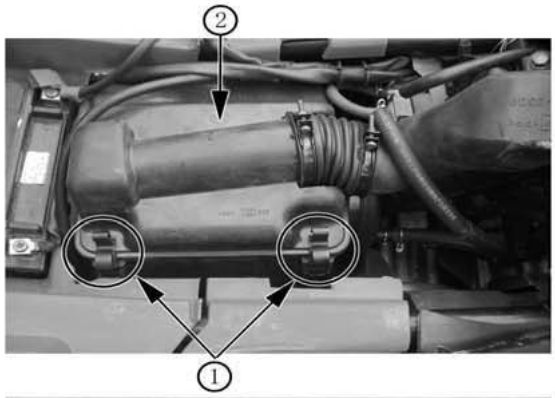
Tool: Spark Plug Wrench，Feeler Gauge

Air Filter

> Inspect every 40 hours or 1000 km, clean it if necessary.

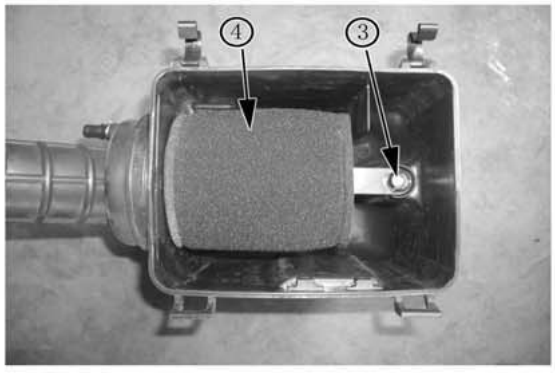
If the air cleaner is clogged with dust, intake resistance will be increased, with a resultant decrease in power output and an increase in fuel consumption. Check and clean the air filter as following:

Remove fixing clamp① and top cover②



> **Note:**
> Be careful not to drop the o-ring into the air filter box that is attached to the air filter top cover.

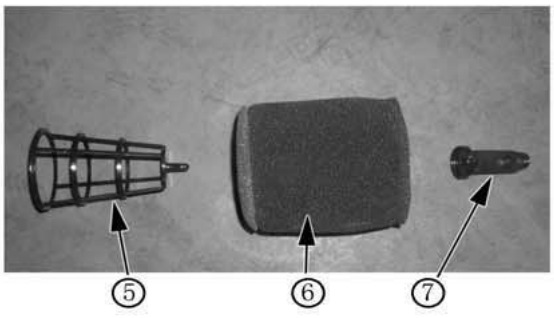
Loosen screw③, remove filter element④, separate support⑤, filter element⑥ and filter element seat⑦.



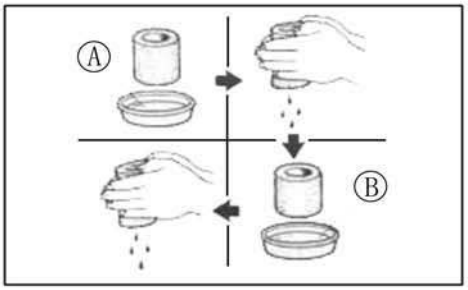
● Fill a wash pan of a proper size with a non-flammable cleaning solvent A. Immerse the filter element in cleaning solvent and wash it.

● Press the filter element between the palms of both hands to remove the excess solvent. Do not twist or wring the element or it will tear.

● Immerse the element in engine oil B, and then. squeeze out the excess oil leaving the element slightly wet.



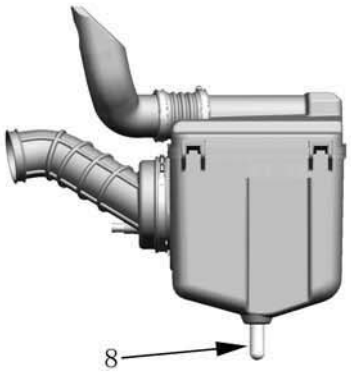
A--Non-flammable cleaning solvent
B—Engine oil SAE#30 or SAE10W/40.



Warning:
Never use with gasoline or low flash point solvents to clean the filter element

Inspect the filter element for tears. torn element must be replaced.

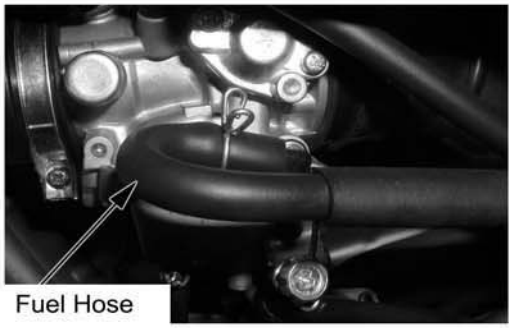
Note:
If driving under dusty conditions, clean the air filter element more frequently. The surest way to accelerate engine wear is to operate the engine without the element or with torn element. Make sure that the air filter element is in good condition at all times.



Remove the drain plug⑧ of air box to drain out any water.

Fuel Hose

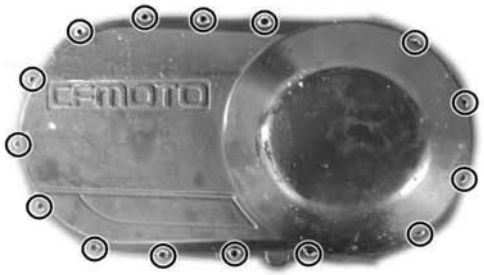
Inspect every 80 hours or 2000 km, replace every 4 years.



Inspect the fuel hose for damage and fuel leakage. If any damages are found, replace the fuel hose with a new one.

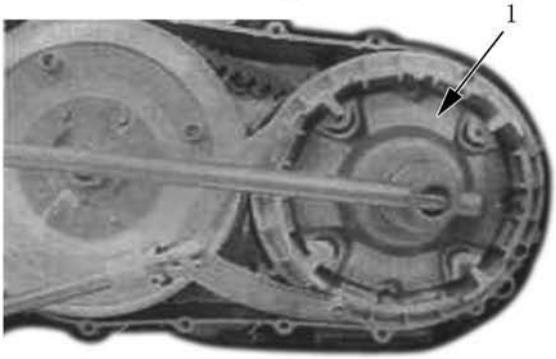
Drive Belt

Removal:
Remove CVT cover



Hold the primary sheave with special tool and loosen primary sheave nut.

Special Tool: Rotor Holder

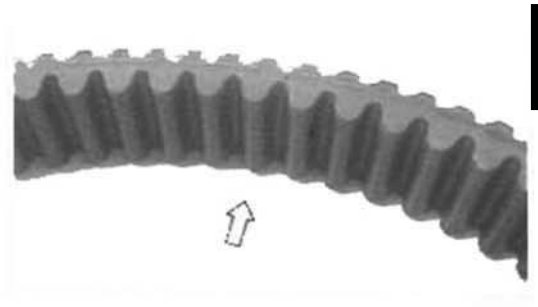


Remove primary sliding sheave 1;
Hold the secondary sheave with special tool and loosen secondary sheave nut. Remove secondary sheave together with drive belt.

Special Tool: Rotor Holder

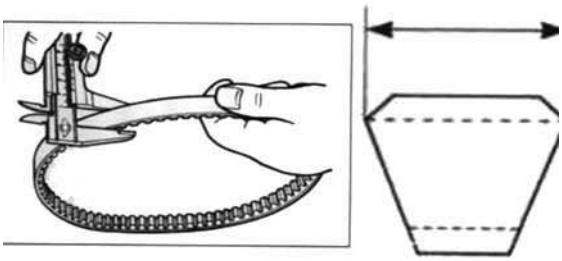
Remove drive belt from secondary sheave

Inspection:



Inspect drive belt for wear and damage. If any cracks or damages are found, replace drive belt with a new one.

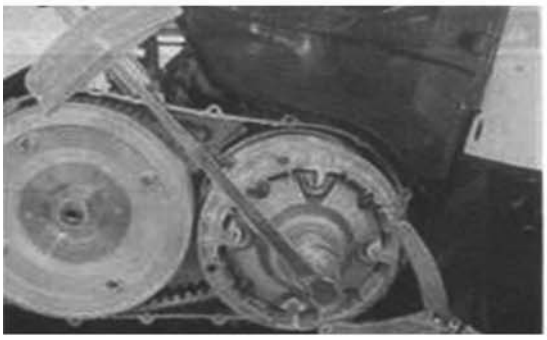
Inspect drive belt for width, if width is out of service limit, replace drive belt with a new one.
Service Limit: 33.5mm
Tool: Vernier Caliper



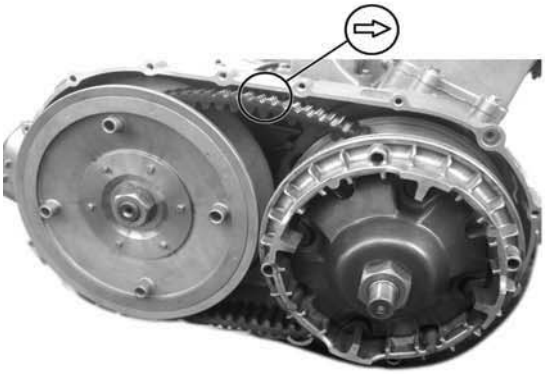
Installation
Reverse the removal procedure for installation. Pay attention to the following:
Insert drive belt, as low as possible, between secondary sliding sheave and primary fixed sheave.
Hold secondary sheave with a special tool and tighten the nut to the specified torque.
Nut, Secondary Sheave: 115 N.m

Install primary sheave and nut. Hold the primary sheave with a special tool and tighten the nut to the specified torque.
Nut, Primary Sheave:115N.m

Turn primary sheave, until the drive belt is properly seated and both the primary and secondary sheaves rotate together smoothly and without slipping.



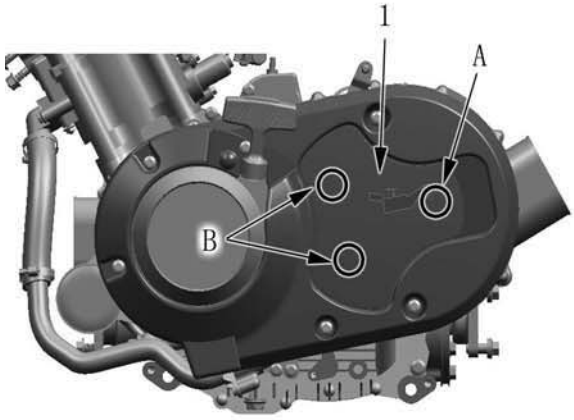
Caution:
- **Fit the drive belt with the arrow on the drive belt points toward normal turning direction.**
- **The drive belt contact surface of the driven face should be thoroughly cleaned.**



Install CVT cover

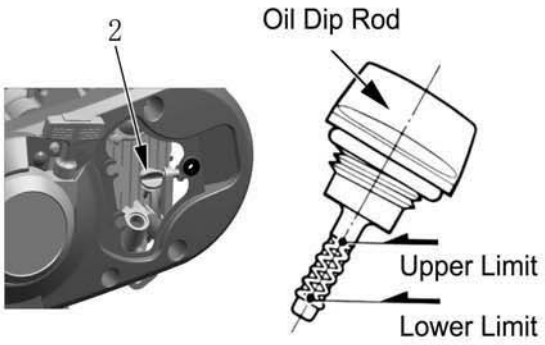
Inspection of Lubrication System

Replace engine oil and oil filter initially at 20 hours or 200km and every 80 hours or 2000km thereafter.



Check Engine Oil Level

- Keep the engine in a plan position.
- Remove the fixture A, fixture B, then remove the left side cover 1.
- Remove oil dip rod 2
- Clean oil dip rod, insert oil dip rod but do not tighten it.
- Take out oil dip rod and check if oil is between upper and lower limit.
- If the engine oil is insufficient, fill more oil until the sufficient oil is obtained.

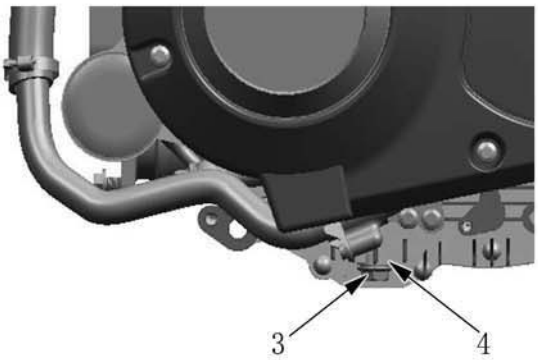


Engine Oil: SAE10W/40 classification SF or SG

Note:
- Keep the engine in a plan position
- Do not tighten oil dip rod when measuring oil level

Replacing Engine Oil

- Remove left side cover 1, oil dip rod 2, drain bolt 3 and washer 4.
- Drain out the engine oil while the engine is still warm.
- Clean oil dip rod, drain bolt and washer with solvent.
- Install washer and drain bolt.



Drain Bolt: 30 N.m

- Fill engine oil. (about 1900ml)
- Install oil dip rod, start the engine and allow it to run for several minutes at idling speed.
- Turn off the engine and wait for about 3 minutes, and then check the oil level on the dipstick.

Caution:
The engine oil should be changed when the engine is warm. If the oil filter should be replaced, replace engine oil at the same time.

Replacing Oil Filter

- Remove relative parts (see Replacing Engine Oil)
- Remove oil filter① with the special tool
- Install washer and drain bolt
- Install new oil filter with the special tool
- Fill engine oil (about 2000ml) and check (see Replacing Engine Oil)

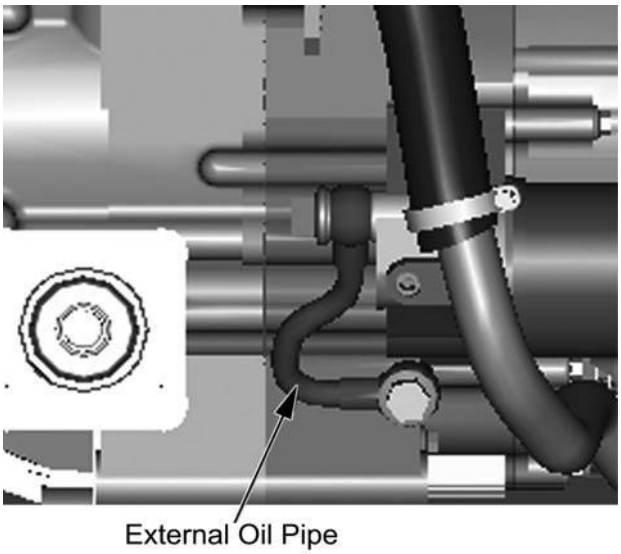
Tool: Oil Filter Wrench

Engine Oil Capacity
When replacing oil: 1.9L
When replacing oil filer: 2.0 L
Engine overhaul:2.2 L

Inspection of External Oil Pipe

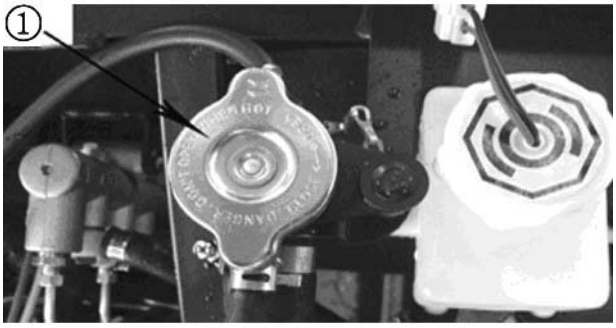
Check external oil pipe for leakage or damage.

Leakage or Damage: → Replace



Inspection of Cooling System

Check initially at 40 hours or 1000km, replace coolant every 2 years.



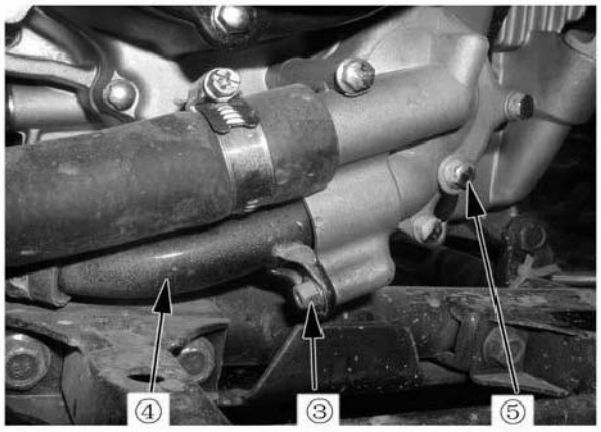
Check radiator, reservoir tank and water hoses.
Leakage or Damage: → Replace
Check coolant level by observing the upper and the lower limit on the reservoir tank.
If the level is below lower limit, fill coolant until the level reaches the upper limit.

Replacing Coolant

- Remove radiator cap and reservoir tank cap .②
- Place a pan below water pump, and drain coolant by removing drain plug and water hose .④
- Drain coolant from reservoir tank.

Warning !

- Do not open radiator cap when engine is hot, you may be injured by escaping hot liquid or vapor.
- Engine coolant is harmful. If coolant splashes in your eyes or clothes, thoroughly wash it away with water and consult a doctor. If coolant is swallowed, induce vomiting and get immediate medical attention.
- Keep coolant away from reach of children



- Clean radiator with fresh water, if necessary.
- Connect water hose and tighten drain bolt securely.
- Fill the specified coolant into the radiator.
- Loosen bleed bolt on water pump, when coolant flow from bleed bolt, tighten the bolt. Install radiator cap ①securely after filling coolant.
- Start the engine and keep it running for several minutes. After warm up and cooling down the engine, open radiator cap and check coolant. Fill the specified coolant until the level is between the upper and lower lines on the reservoir tank.

Caution:
Repeat the above procedures several times and make sure the radiator is filled with coolant and air is discharged.

Install reservoir tank cap.

Warning: Never mix with other brand.

Inspection of Radiator Hose

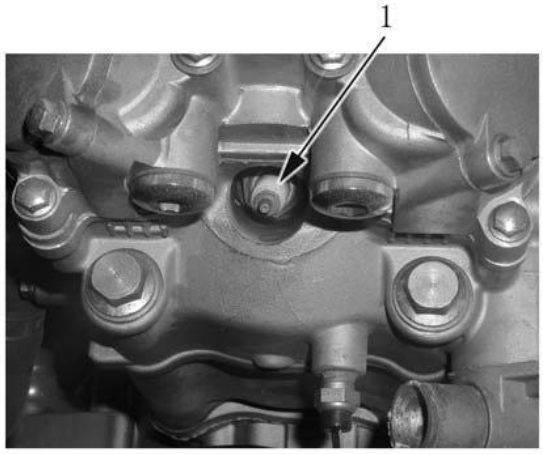
Perform inspection every 40 hours or

Check radiator hose and clamp.
Leakage or Damage: →Replace

Inspection of cylinder pressure

Check cylinder pressure is necessary.
Cylinder Pressure: 1000kpa

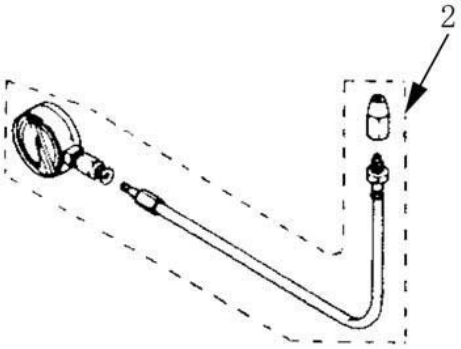
A lower cylinder pressure may be caused by:
- Excessive wear of cylinder;
- Wear of piston or piston ring;
- Piston ring jam in groove;
- Poor closure of valve seat;
- Damaged cylinder gasket or other defects



Note: When cylinder pressure too low, check the above items.

Testing Cylinder Pressure

Note: Before testing of cylinder pressure, make sure that cylinder head bolts are tightened to the specified torque and valve clearance has been properly adjusted.



- Warm up the engine before testing;
- Make sure battery is fully charged;
- Remove spark plug 1;
- Install cylinder pressure gauge 2 in spark plug hole and tighten nut;
- Keep throttle full open;
- Press start button crank the engine a few seconds. Record the maximum reading of cylinder pressure.

Tools: Cylinder Pressure Gauge Adaptor.

Inspection of Oil Pressure

Oil Pressure: 130～170kpa at 3000r/min

Lower or higher oil pressure may be caused by:

Ⅰ **Oil pressure is too low**

- Clogged oil filter;
- Leakage from oil passage;
- Damaged O-ring;
- Oil pump failure;
- Combination of above items;

Ⅱ **Oil pressure is too high**

- Oil viscosity is too high;
- Clogged oil passage;
- Combination of above items;

Testing Oil Pressure

Remove bolt①;

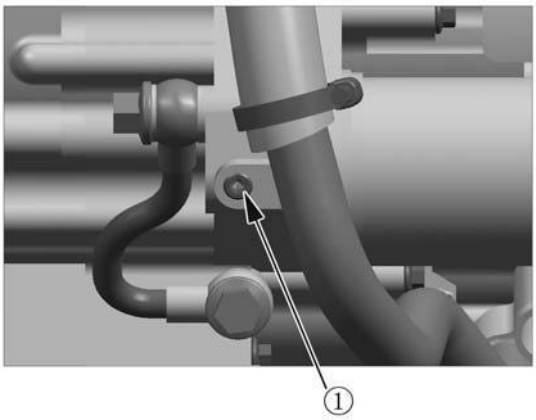
- Connect tachometer with ignition coil
- Install oil pressure gauge and joint seat to main oil gallery.
- Warm up engine as per following:
  Summer: 10 minutes at 2000r/min
  Winter: 20 minutes at 2000r/min

After warming up, increase engine speed to 3000r/min, and record readings of oil pressure gauge.

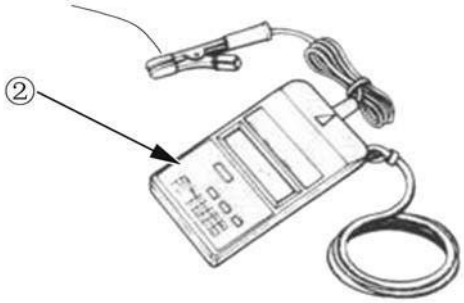
- After testing, apply thread locker to the thread in the hole of main oil channel. Install bolt and tighten to the specified torque.

Tighten torque：23N.m

Tools：Oil pressure gauge
Tachometer



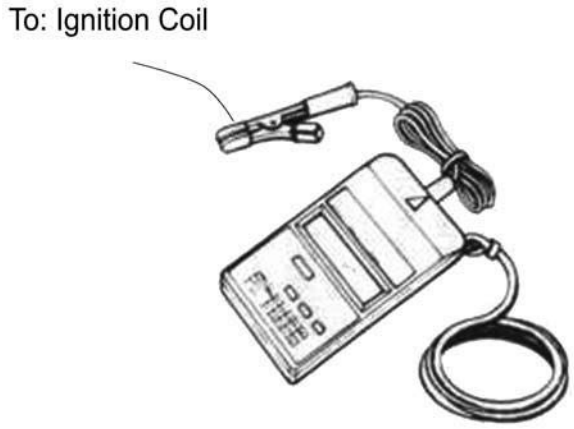
To: Ignition Coil



Inspection of Clutch Engagement and Lock-up

CF engine is equipped with a centrifugal type automatic clutch.

Before checking the initial engagement and clutch lock-up two inspection checks must be performed to thoroughly check the operation of the drive train.



I Initial Engagement Inspection

- Connect tachometer to ignition coil
- Start engine
- Shift gear lever to "High" position
- Slowly increase throttle and note down the engine speed (r/min) when the vehicle starts to move forward.

Engagement speed:1800r/min～2400r/min

If the engagement speed is out of the above range, check the following:

- Clutch shoes
- Clutch shoe wheel
- Primary and secondary sheave

Refer to Chapter 12 for inspection of clutch

II Clutch Lock-up Inspection

- Connect the tachometer to ignition coil;
- Start the engine;
- Shift gear lever to "High" position;
- Apply front and rear brakes as firmly as possible;
- Fully open the throttle for a brief period and note the maximum engine speed obtained during the test cycle.

Lock-up Speed: 3300r/min～3900r/min

Warning: Do not apply full power for more than 5 seconds or damage to clutch or engine may occur.

If the lock-up speed is out of the above range, check the following:

- Clutch shoes
- Clutch wheel
- Primary and secondary sheave

Refer to Chapter 12 for inspection of clutch

Tool: Tachometer

Cooling System Illustration……4-2

Engine Coolant……4-3

Inspection of Cooling Circuit……4-3

Inspection and Cleaning of Radiator and Water Hoses……4-4

Inspection of Fan Motor……4-5

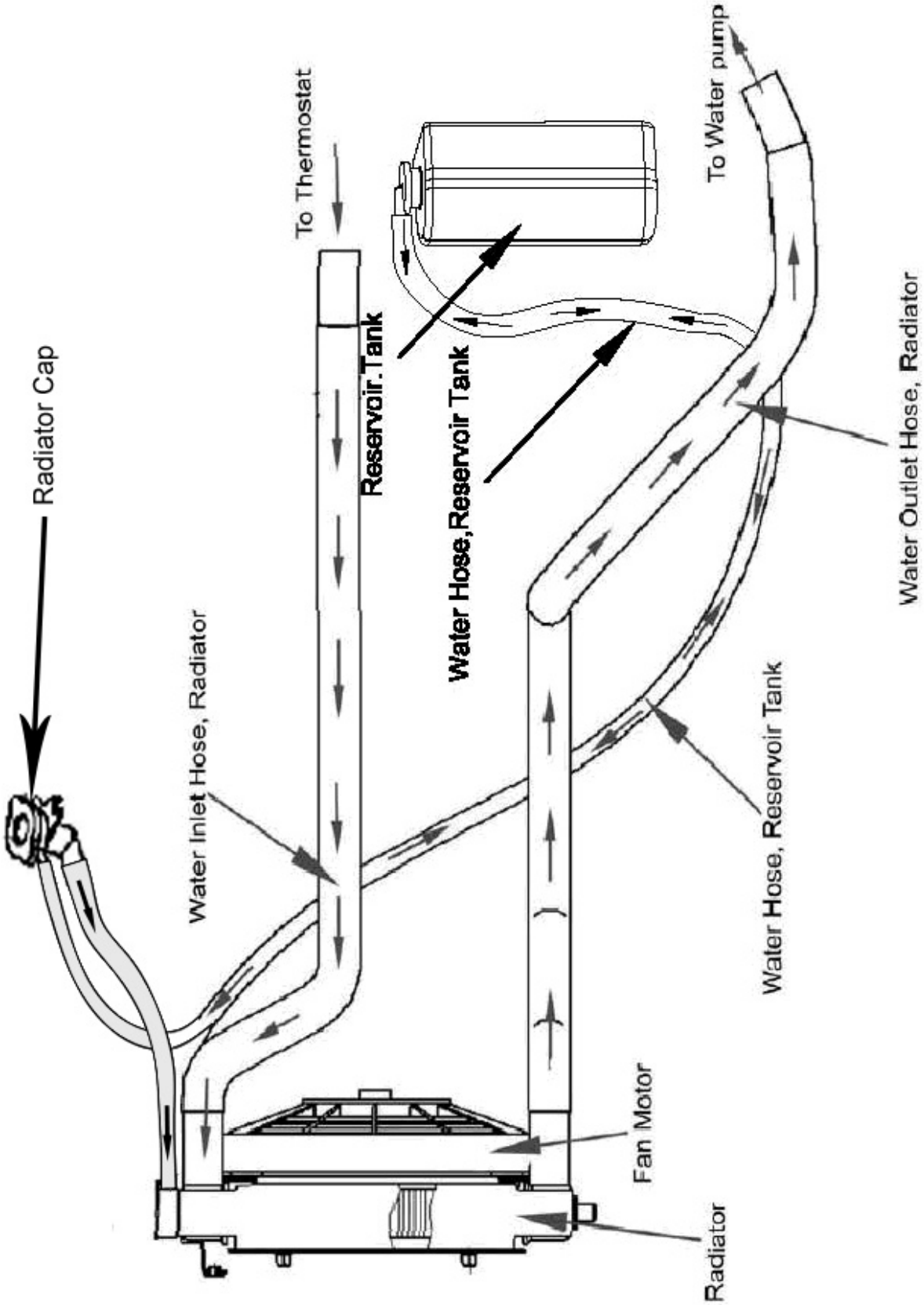
Inspection of Water Temperature Sensor……4-6

Inspection of Thermostat……4-6

Water Pump……4-7
- Water Pump Removal and Disassembly……4-7
- Inspection……4-9
- Water Pump Assembly and Installation……4-10

Lubrication System Illustration……4-14

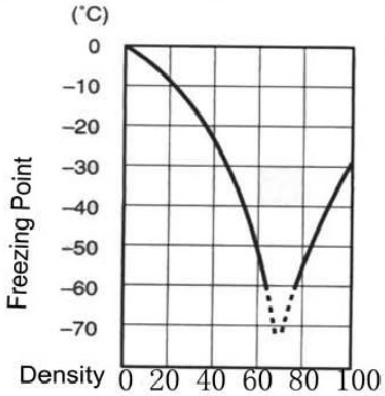
Cooling System Illustration

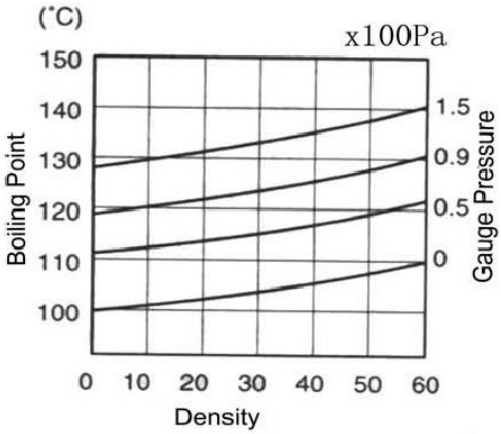


Engine Coolant

The coolant used in cooling system is a mixture of 50% distilled water and 50% ethylene glycol antifreeze. This 50:50 mixture provides the optimized corrosion resistance and fine heat protection. The coolant will protect the cooling system from freezing at temperature above –35℃. If the vehicle will be operated at the environmental temperature below –35℃, the mixing ratio of coolant should be increased to 55% or 60% according to the figure on the right.

Anti-Freeze Density	Freezing Point
50%	-35℃
55%	-40℃
60%	-55℃





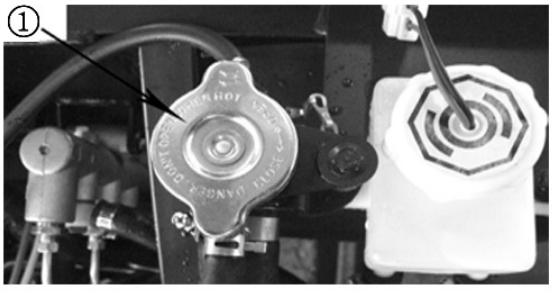
Note:Use high quality ethylene glycol base antifreeze and mixed with distilled water. Never mix an alcohol base antifreeze and different brands of antifreeze;The ratio of antifreeze should not be more than 60% or less than 50%;
Do not use anti-leak additive;

Warning !

- DO NOT open radiator cap when the engine is still hot. Or you may be injured by scalding fluid or steam;
- Coolant is harmful. DO NOT swallow or stain your skin or eyes with coolant. In case of accidental swallow or stains, flush with plenty of water and consult the doctor immediately.
- Keep coolant away from reach of children.

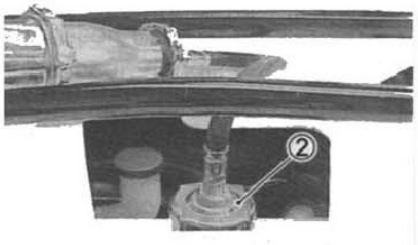
Inspection of Cooling Circuit

- Remove radiator cap① and connect tester ② to filler.



Warning!
Do not open the radiator cap when the engine is still hot.

- Give a pressure of 120 kPa and check if the cooling system can hold this pressure for 10 seconds.
- If the pressure drops during this 10 seconds, it indicates that the there is leakage with the cooling system. In this case, check the complete system and replace the leaking parts or components.



Warning!

- When removing the radiator cap tester, put a rag on the filler to prevent splash of coolant.

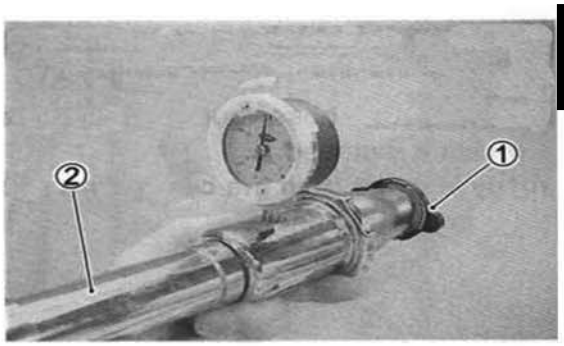
Warning!

- Do not allow a pressure to exceed the radiator cap release pressure.

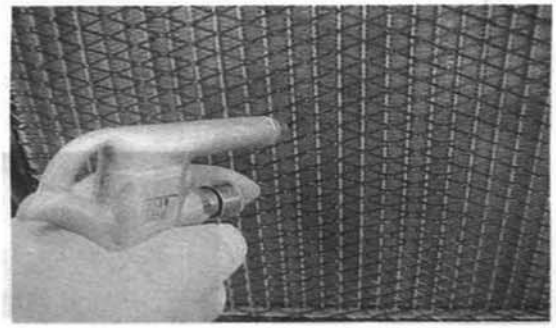
Inspection and Cleaning of Radiator and Water Hoses

Radiator Cap

- Remove radiator cap①
- Install radiator cap to cap tester②



- Slowly increase pressure to 108 kPa and check if the cap can hold the pressure for at least 10 seconds.

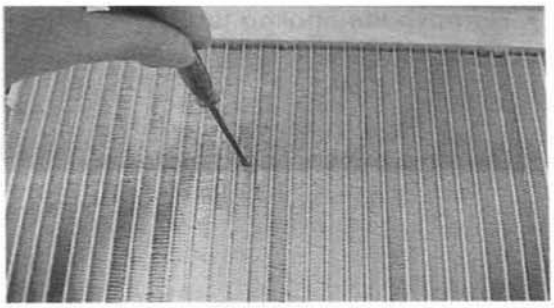


- If the cap cannot meet the pressure requirement, replace it.

Radiator Cap Valve Opening Pressure:
Standard: 108 kPa
Tool: Radiator Cap Tester

Radiator Inspection and Cleaning

- Remove dirt or trash from radiator with compressed air;



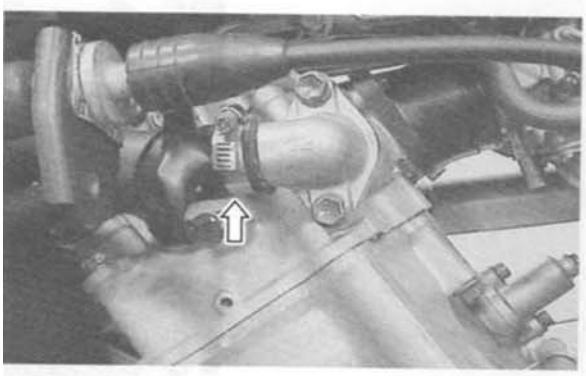
- Correct the radiator fins with a small screwdriver;

Radiator Hose Inspection

- Check radiator hoses for leakage or damage.

Leakage or Damage: → Replace

- Check tightening of clamps. Replace the clamps if necessary;

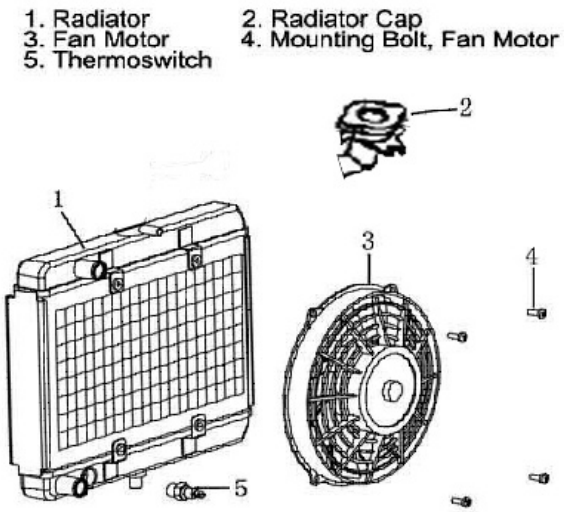


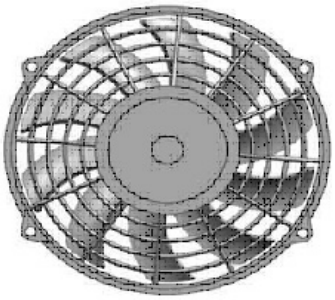
- After inspection and cleaning of radiator and hoses, check coolant level. Fill coolant if necessary.

Inspection of Fan Motor

- Remove fan motor from radiator
- Turn the vanes and check if they can turn smoothly;
- Check fan motor: Make sure that the battery applies 12 volts to the motor and the motor will run at full speed while the ammeter shall indicate the ampere not more than 5A.
  If the motor does not run or the ampere exceeds the limit, replace the motor.
- Installation: Apply a little thread locker to the bolts and tighten to the specified torque.

Fan Motor Bolt Tightening Torque: 10N.m





Inspection of Thermoswitch

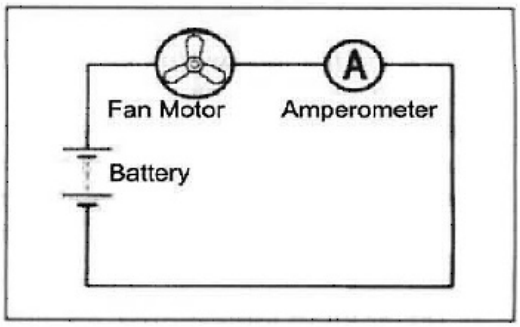
- Remove thermoswitch
- Check the thermoswitch for closing or opening by testing it at the bench as illustrated. Connect the thermoswitch① to the circuit tester, place it in a vessel with engine oil. Place the vessel above a stove.
- Heat the oil to raise the temperature slowly and take the reading from thermometer ② when the thermoswitch closes and opens.

Tool: ammeter

Thermoswitch Operating Temperature

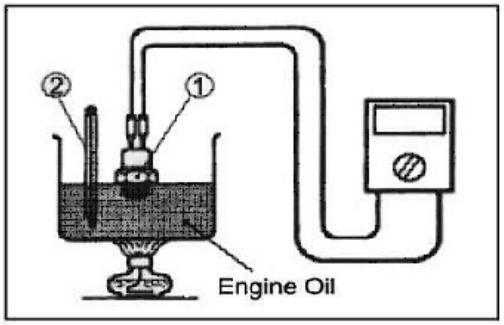
Standard: (OFF-ON): Approx. 88℃

(ON-OFF): Approx. 82℃

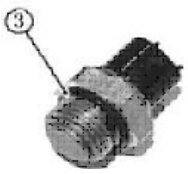


Note:

- Avoid sharp impact on thermoswitch.
- Avoid contact of thermoswitch with thermometer or vessel



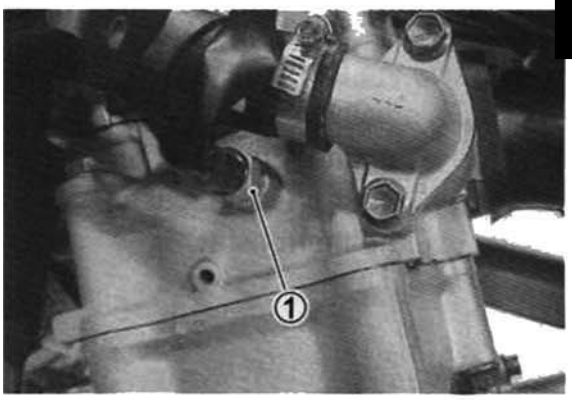
- **Installation:** Use a new O-ring③ and tighten the thermoswitch to the specified torque:



Thermoswitch Tightening Torque: 17N.m

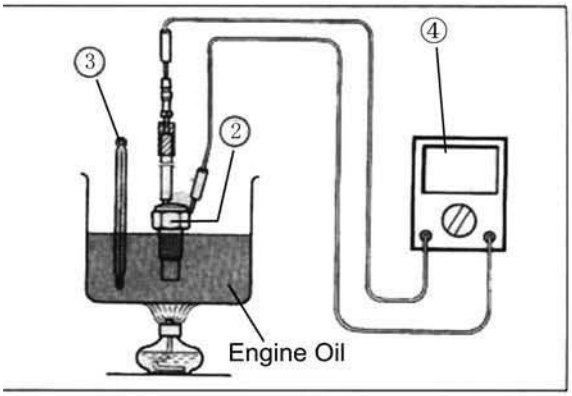
- Check coolant level after installation of thermoswitch. Fill coolant if necessary.

Inspection of Water Temperature Sensor



- Place a rag under water temperature sensor① and remove it from cylinder head.

- Check the resistance of water temperature sensor as illustrated on the right. Connect the temperature sensor② to the circuit tester, place it in a vessel with engine oil. Place the vessel above a stove.
- Heat the oil to raise the temperature slowly and take the reading from thermometer ③ and ohmmeter ④ .

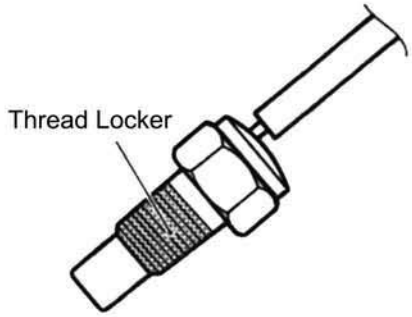


Water Temperature and Resistance

Temperature(℃)	50	80	100	120
Resistance(Ω)	154±16	52±4	27±3	16±2

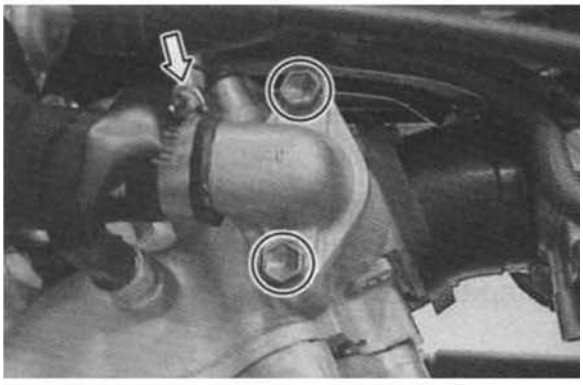
Installation: Apply a little thread locker and install it to the cylinder head by tightening to the specified torque.

Water Temperature Sensor
Tightening Torque: 10N.m



Note:
- Avoid sharp impact on temperature sensor
- Avoid contact of temperature sensor with thermometer or vessel

- After installation, check the coolant level. Fill coolant if necessary.



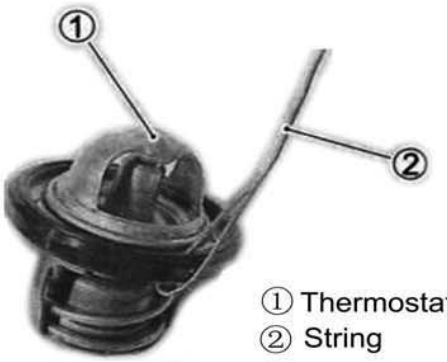
Inspection of Thermostat

- Remove thermostat case

- Remove thermostat

- Check thermostat pellet for cracks
- Test the thermostat in the following steps:

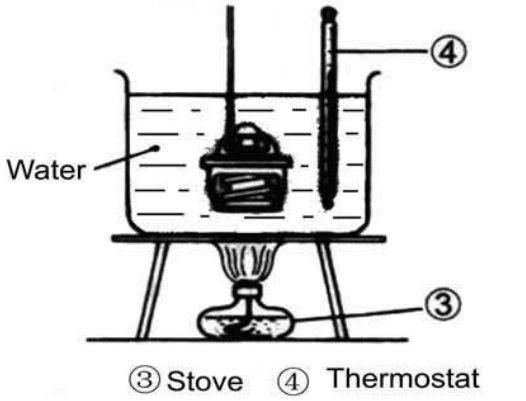
- Pass a string between thermostat flange as illustrated on the right;
- Immerse the thermostat in a beaker with water. Make sure that the thermostat is in the suspended position without contact to the vessel. Heat the water by placing the beaker above a stove and observe the temperature rise on a thermometer;
- Take the temperature reading from thermometer when the thermostat valve opens.



Thermostat Valve Opening Temperature: 68-74℃

- Keep heating the water to raise the water temperature.

- Just when the water temperature reaches the specified value, the thermostat valve should have been lifted by 3.5-4.5mm

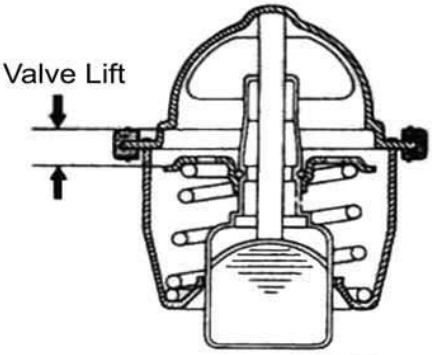


Installation:

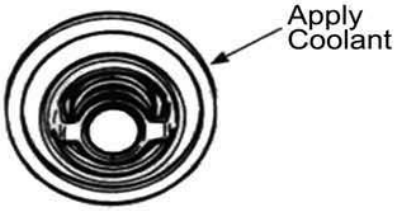
- Reverse the removal procedure for installation.

- Apply coolant to the rubber seal of thermostat.

- Install thermostat case. Tighten to the specified torque:



Tightening Torque: 10N.m

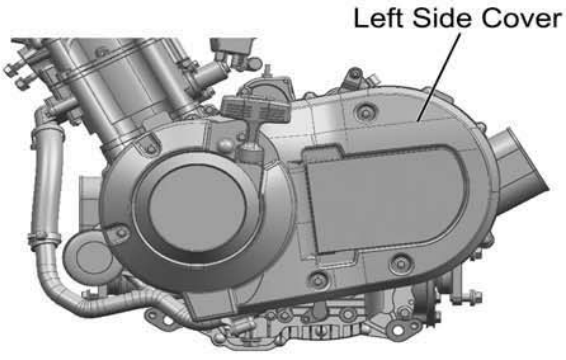


Water Pump

- Removal and Disassembly

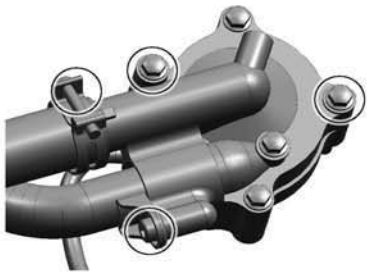
- Remove engine left side cover;

- Drain coolant (→3-20)



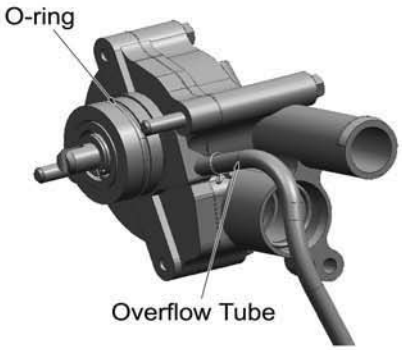
Note: Before draining coolant, check water pump for oil or coolant leakage. In case of oil leakage, check the water pump oil seal, O-ring. In case of coolant leakage, check the water seal.

- Remove clamps and water hoses



- Release bolts and remove water pump

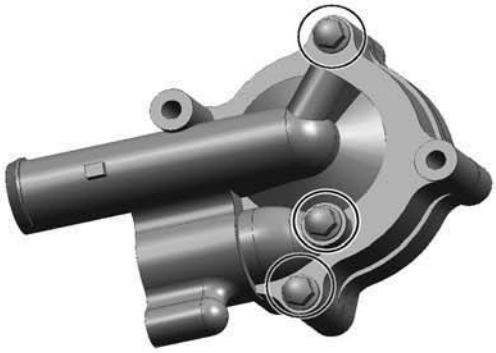
- Remove O-ring



Note: Do not reuse the O-ring.

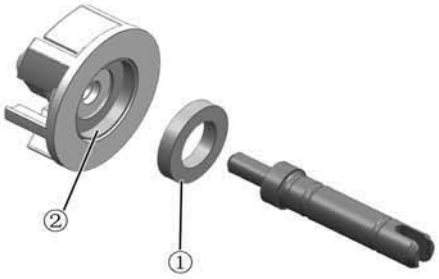
- Remove the overflow tube

- Release water pump cover screws, water pump cover and gasket



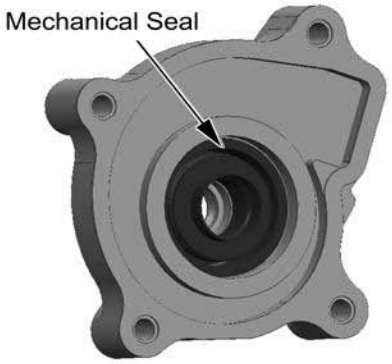
- Remove E-ring and impeller

- Remove seal ring ①and rubber seal②



- Remove mechanical seal with special tool

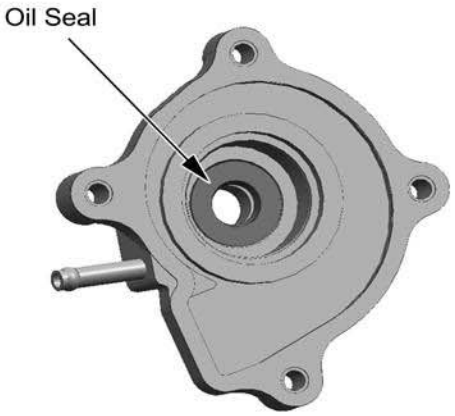
Note: The mechanical seal does not need to be removed if there is no abnormal condition.
Note: Do not reuse a removed mechanical seal.



- Put a rag on the water pump body

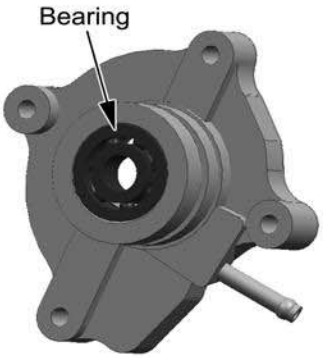
- Remove oil seal.

Note: The oil seal does not need to be removed if there is no abnormal condition
Note: Do not reuse a removed oil seal



- Remove bearing with special tool.

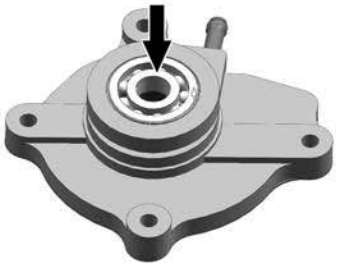
Note: The bearing does not need to be removed if there is no abnormal noise.
Note: Do not reuse a removed bearing.



Inspection of Water Pump

Bearing

- Check the play of bearing by hand while it is still in the water pump body;
- Turn inner race of bearing to check for abnormal noise and smooth rotation;
- Replace the bearing if there is abnormal condition;



Mechanical Seal

- Check mechanical seal for damage, pay special attention to the seal face;
- In case of leakage or damage, replace the mechanical seal. If necessary, also replace the seal ring.

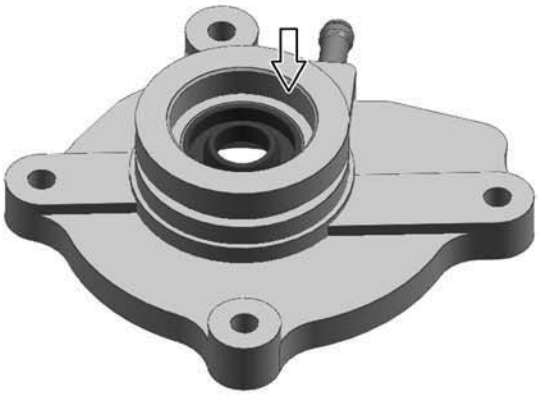
Oil Seal

- Check oil seal for damage. Pay special attention to the oil seal lip;
- In case of damage or leakage, replace the oil seal;

Water Pump Body

- Check the mating mace of water pump body with bearing and mechanical seal.

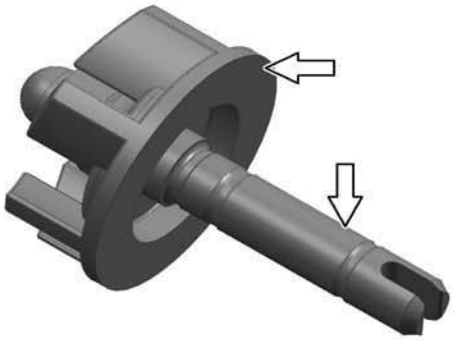
Damage: →Replace



Impeller

- Check the impeller and shaft for damage.

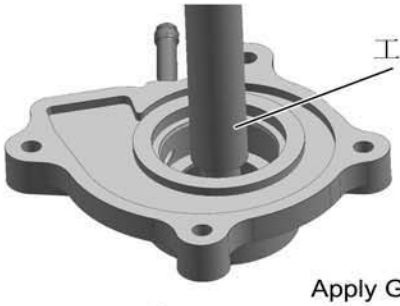
Damage: →Replace



Assembly and Installation of Water Pump

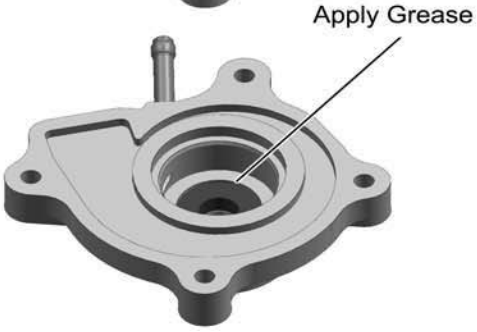
- Install oil seal with special tool;

Tool: Oil Seal Installer



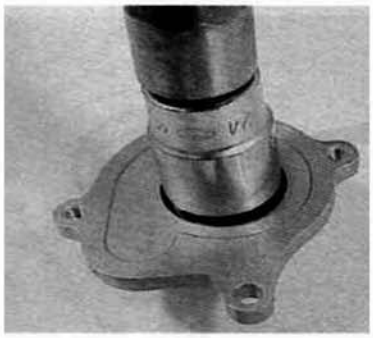
Note: The stamped mark on the oil seal faces outside

- Apply a little grease to the oil seal lip

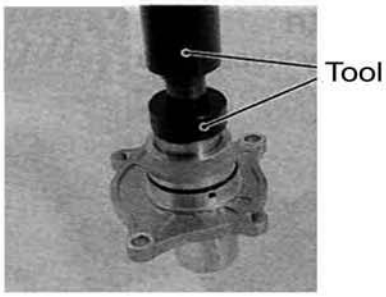


- Install mechanical seal with a suitable socket wrench

Note: Apply sealant to side “A” of mechanical seal.



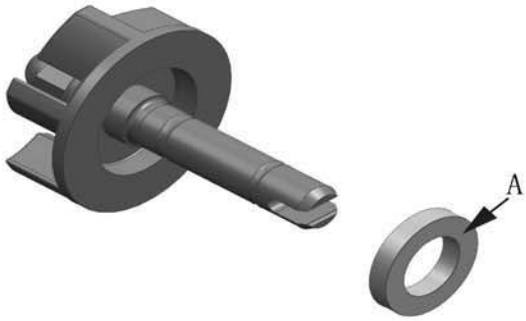
- Install bearing with special tool



Tool: Bearing Installer

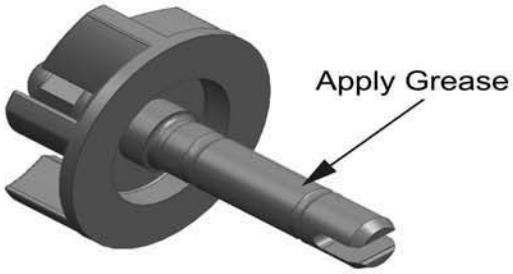
Note: The stamped mark on the bearing faces outside.

- Install seal ring to impeller
- Clean off the oil and grease from mechanical seal and install it into the impeller.



Note: “A” side of mechanical seal faces impeller.

- Apply grease to impeller shaft
- Install impeller shaft to water pump body.

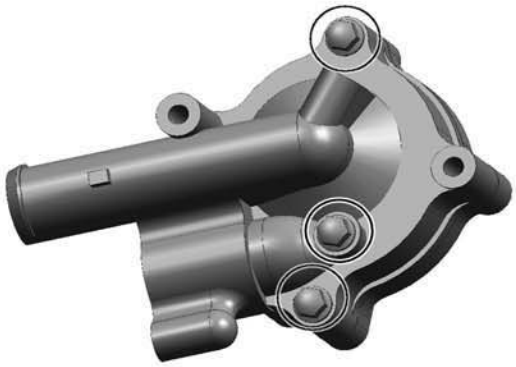


- Install E-ring to water pump shaft;

- Install new gasket to water pump body;

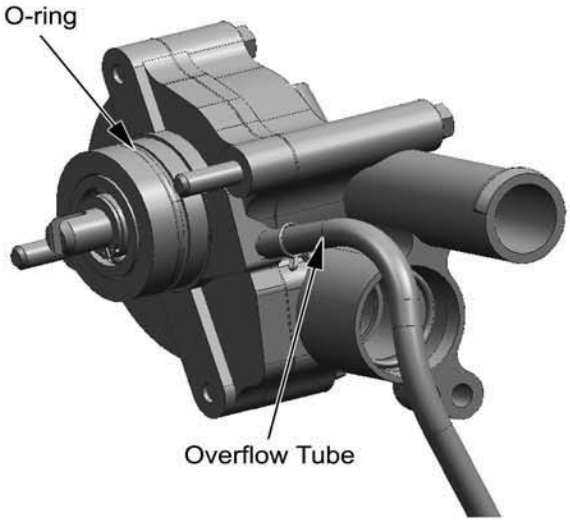
- Install water pump cover and tighten the bolts and bleed bolt.

Water Pump Cover Bolts Tightening Torque: 6N.m



- Check impeller for smooth turning.

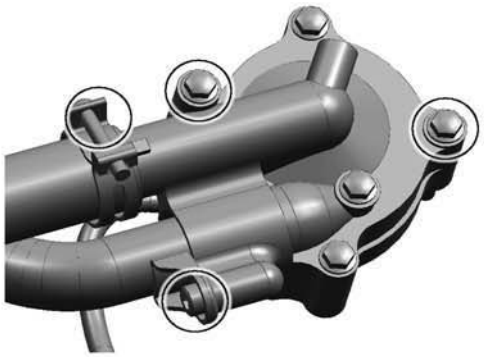
- Install the new O-ring



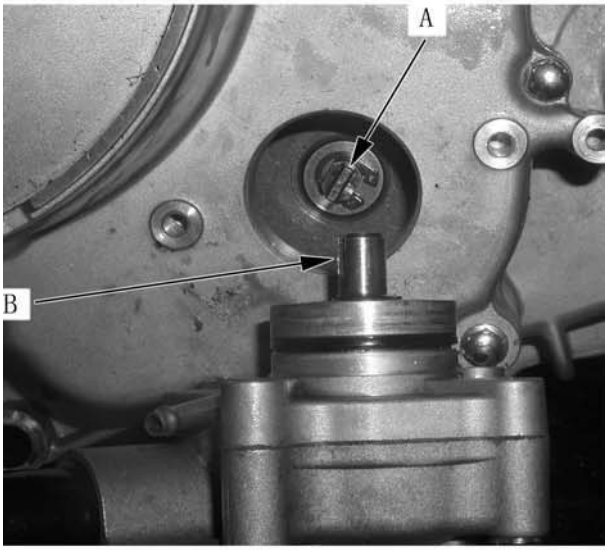
Note:
- Use the new O-ring to prevent oil leakage;
- Apply grease to O-ring

- Install water pump and tighten the bolts to the specified torque;

Water pump bolts tightening torque: 10N.m



Note: Set the water pump shaft slot end “B” to oil pump shaft flat side “A”.



- Connect water hoses

- Add coolant

- Install left side cover

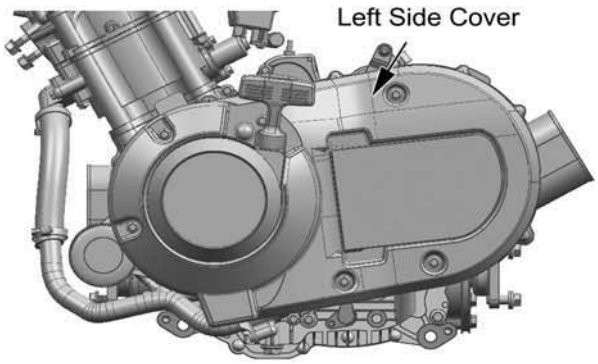
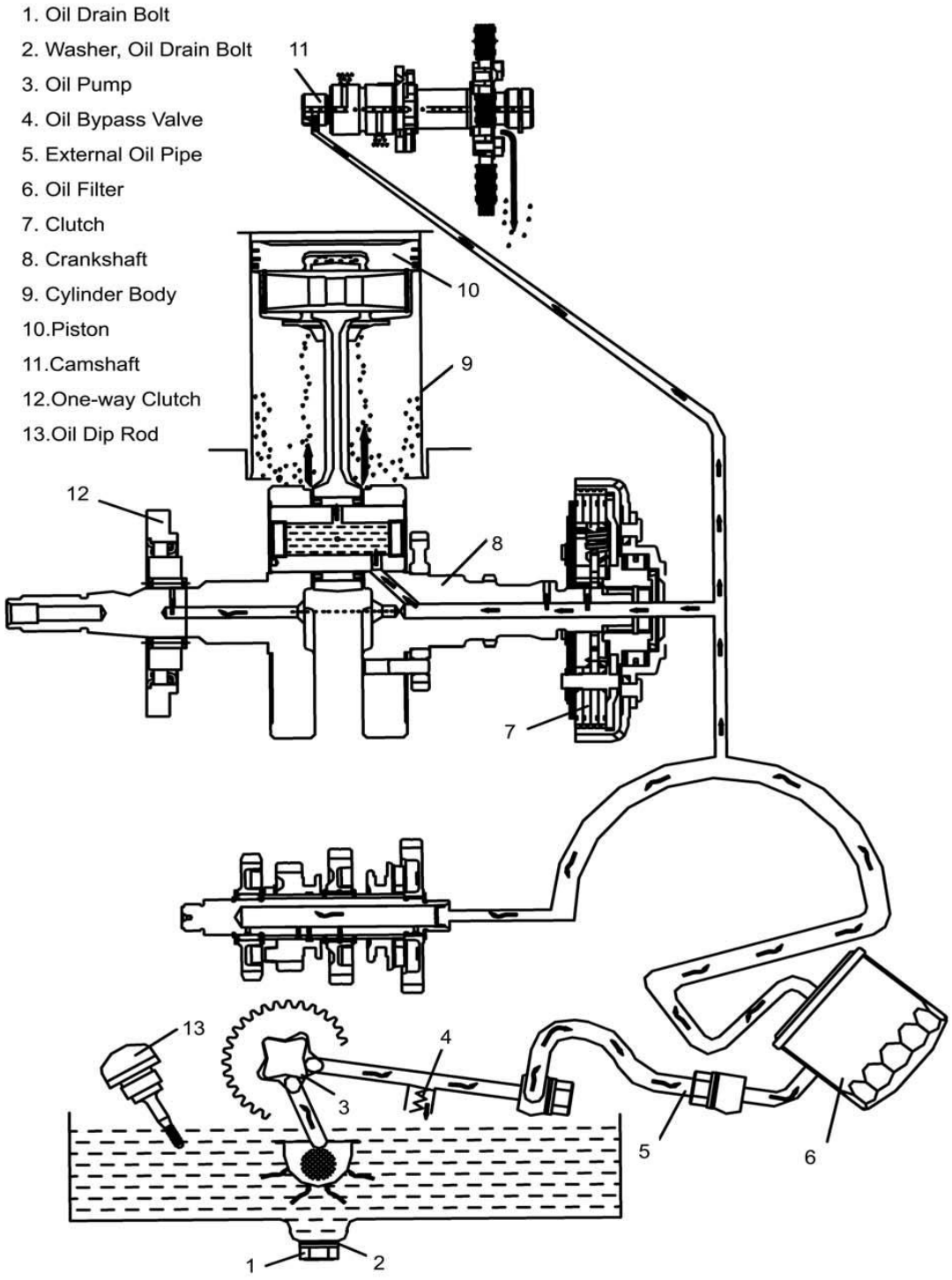


Illustration of CF188 Engine Lubrication System



Inspection of Lubrication System (→3-18)

Inspection of Oil Pump and Relief Valve(→6-41)

Inspection Information……5-1
Engine Removal and Installation…5-2
Removal and Installation of Front and Rear axle……5-5
Removal and Installation of Gearshift…5-7

Inspection Information

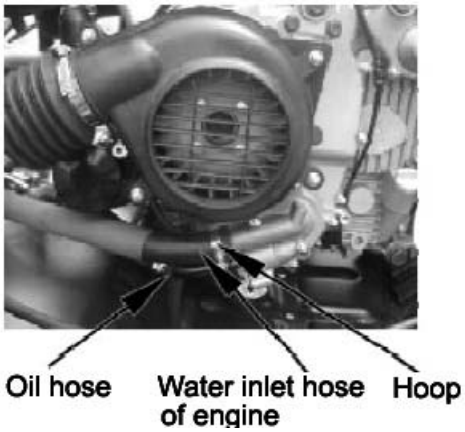
Note:

● When removal Engine, please use jack to support the bodywork. Don't damnify the frame, body of Engine, bolt and cable etc.
● Please blind up the frame when removal the engine.
● Don't removal engine from the bodywork when operating as follows:
—OIL PUMP
—CARBURETOR, AIR FILTER.
—COVER, CYLINDER HEAD,CYLINDER HEAD,CYLINDER,CAMSHAFT.
—CVT SYSTEM, LEFT SIDE COVER.
—DECELERATE BOX.
—RIGHT SIDE COVER,AC MAGNETO,WATE PUMP.
—PISTON、 PISTON RING, PISTON PIN.
● Separately the engine from the bodywork when operating as follows:
—CRANKCASE

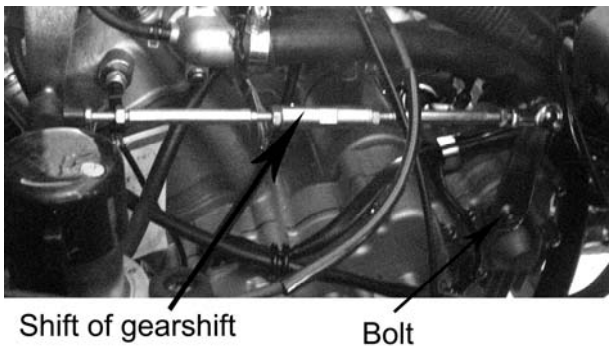
TIGHTEN TORQUE INSTALL BOLT UNDER ENGINE 50～60N.m
JOINT NUT OF CUSUION MAT 45～50N.m

Disassembly Engine

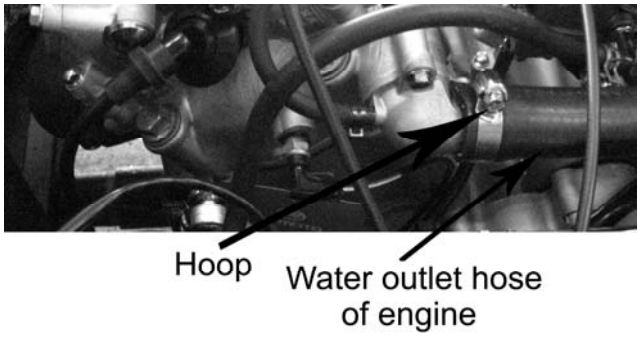
Remove plastic parts（→Chapter 2）
Remove air filter
Remove carburetor
Remove hoop
Remove water inlet hose of engine
Remove inlet and outlet oil hose of engine



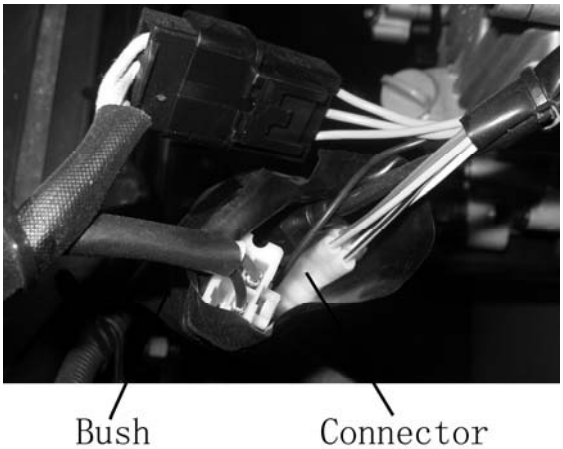
Remove bolt
Remove shift of gearshift



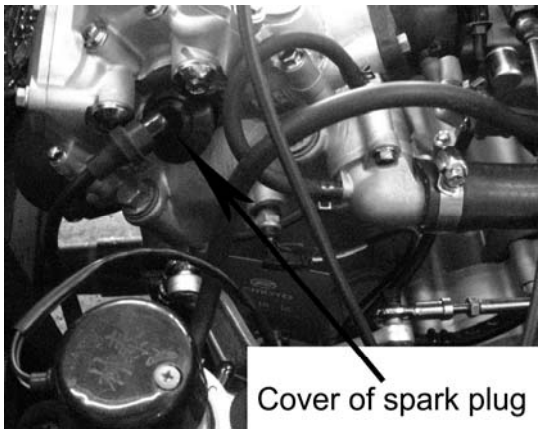
Remove hoop
Remove water outlet hose of engine



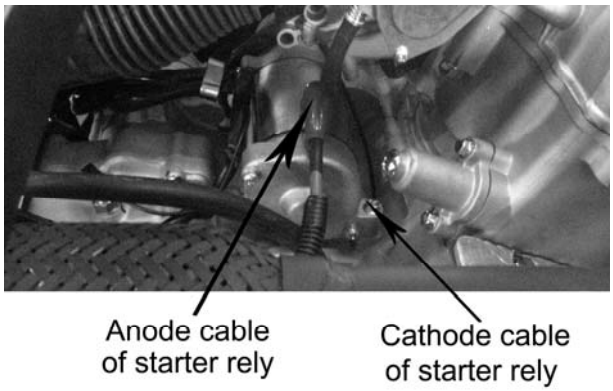
Remove magneto connector、speed sensor connector, trigger connector、water temperature sensor connector, gear position sensor and so on.



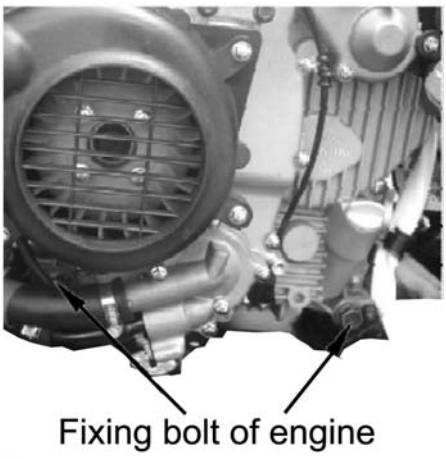
Remove spark plug



Separate jacket of starter relay, remove nut, remove anode cable of starter relay.



Remove bolt and cathode cable of starter rely



Remove fixing bolt of engine

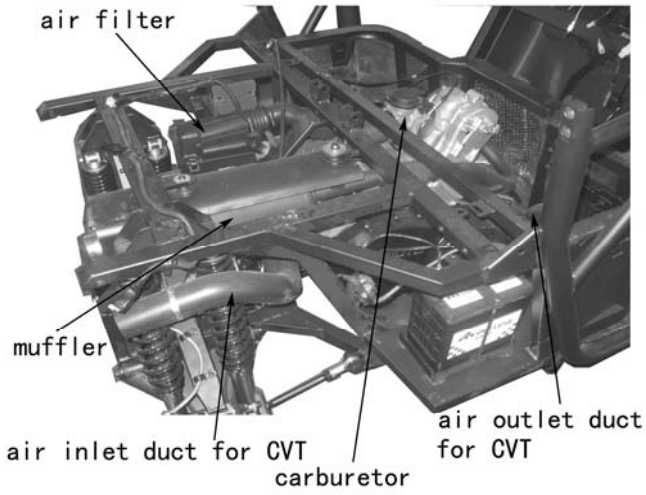
Remove hoop of air inlet and outlet duct for CVT

Remove carburetor

Remove air filter

Remove muffler（→2-18）

Remove gearshift（→2-7）



Installation of engine

Put engine on the bodywork. first, install two bolt and nut, then, install upper bracke and rear bracket.

Tighten moment£ı

upper bracke of engine:35 ~ 45N·m

Adown fixing bolt of engine:50 ~ 60N·m

Install water inlet and out let hose in the engine by hoop

Install anode and cathode cable of starting

Joint the connector of electrical cable.

Install cap of spark plug

Install shift of gearshift

Install air filter,carburetor and other parts after remove.

Removal and Installation of Front and Rear axle

Disassembly

Hang the bodywork in the air by jack, keep it doesn't falling.

Remove cover parts(→Chapter 2)

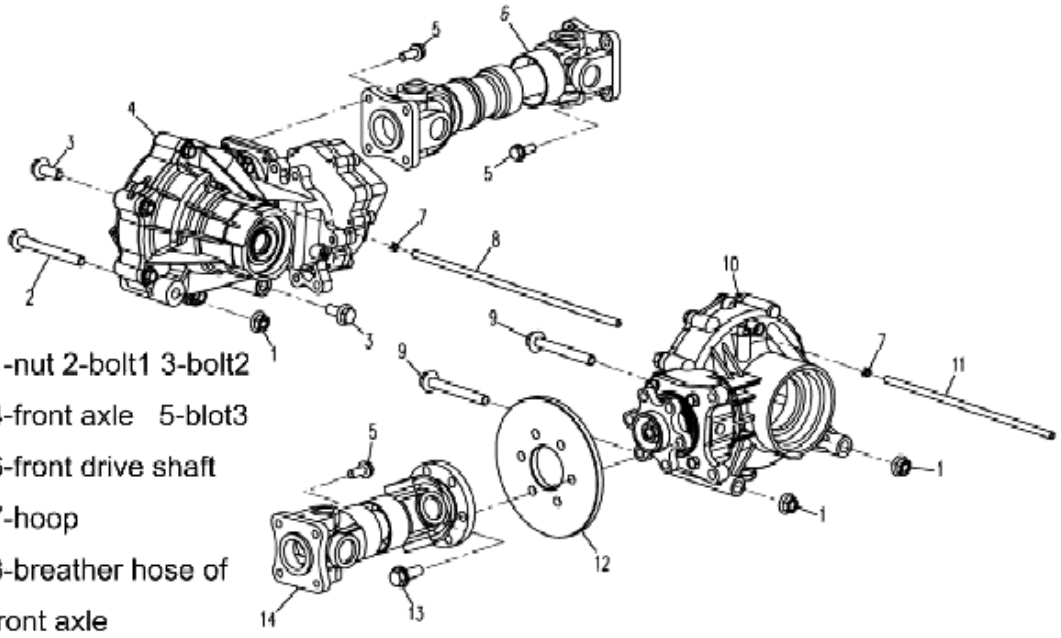
Remove front and rear wheels and rocker (→Chapter 8 Chapter 9)

Remove air filter

Remove carburetor

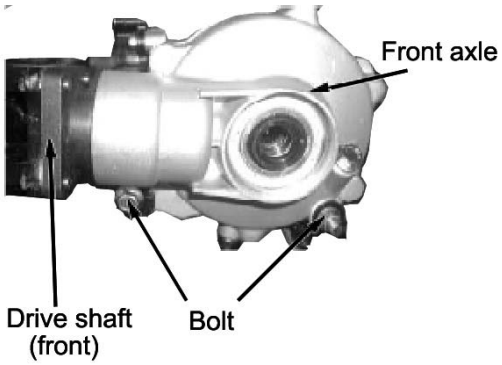
Remove engine

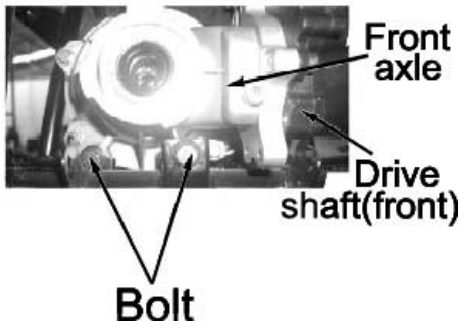
Remove rear brake caliper (→Chapter 9)



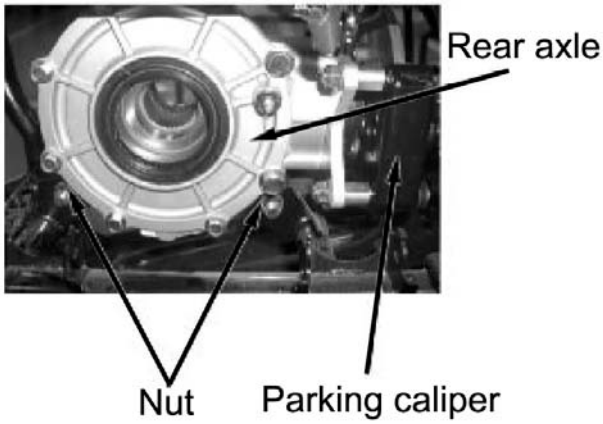
1-nut 2-bolt1 3-bolt2
4-front axle 5-blot3
6-front drive shaft
7-hoop
8-breather hose of front axle
9-bolt4 10-rear axle 11-treather hoseof rear axle 12-rear brake dise
13-bolt5 14-rear drive shaft

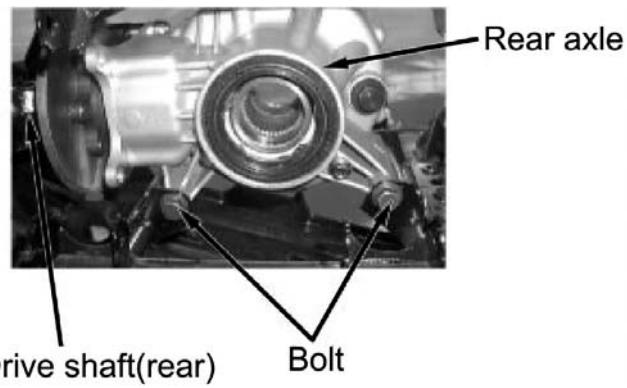
Remove bolt and nut fixed in the frame of front axle.





Remove bolt and nut fixed in the frame of Rear axle





Remove joint bolt in drive shaft, Front and Rear axle
Remove Front and Rear axle, Drive shaft and Rear brake disc

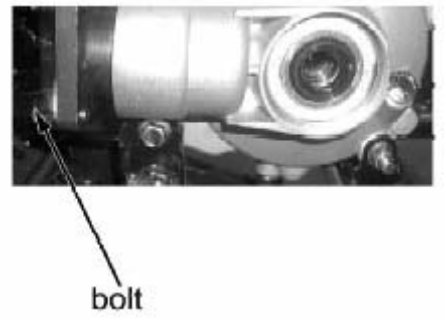
Installation

Installation as contradictorily process of remove

Bolt torque of Front axle：45-50N·m

Bolt torque of Rear axle: 45-50N·m

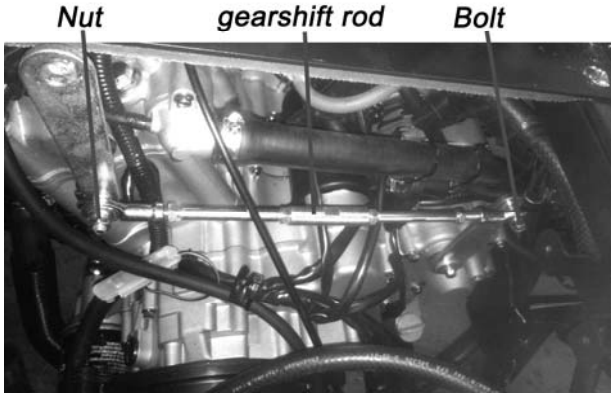
Bolt torque of Front and Rear drive shaft: 40-45N· m



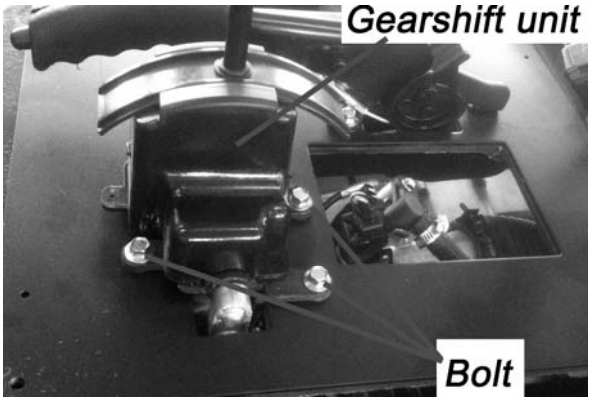
Gearshift

Disassembly

Remove seat, driver（→2-6）
Remove seat, passenger（→2-6）
Remove decorate cover，gearshift（→2-7）
Remove Bolt
Remove nut
Remove gearshift rod
.



Remove the 3 bolts
Remove gearshift unit



Installation

Reverse the removal procedure for installation
Make sure that gearshift is flexible.
Need to inspect agility of gearshift, if not,
In case of any inflexibility, adjust the gearshift rod to ensure the gear engagement.

Δ Engine Removal/Installation Orders and the Relative Page Numbers

Item	Description	Disassembly	Inspection / Maintenance	Assembly	Remarks
Engine Periphery	Water Hose/Pipe	6-2	3-24	6-69	
	Left Side Cover	6-2	—	6-69	
	Recoil Starter	6-2	6-49	6-68	
Engine Front Side	Spark Plug	6-2	3-17	6-68	
	Cylinder Head Cover	6-3	6-14	6-66	
	Tensioner	6-3	6-24	6-67	
	Camshaft	6-3	6-21	6-65	
	Cylinder Head/Tensioner Plate	6-4	6-15/6-23	6-64	
	Cylinder/Timing Chain Guide	6-4	6-24/6-23	6-64	
	Piston	6-5	6-25	6-62	
Engine Left Side	Starting Motor	6-5	14-2	6-62	
	Oil Filter	6-6	3-22	6-62	
	Sector Gear	6-6	—	6-62	
	Water Pump	6-7	4-7	6-61	
	Sheave Drum	6-7	6-48	6-60	
	Left Crankcase Cover/ Magneto Stator	6-7	6-48	6-60	
	Magneto Rotor	6-7	6-47	6-60	
	Starting Driven Gear	6-8	6-47	6-59	
	Starting Dual Gear/Idle Gear	6-8	6-48	6-59	
	Oil Pump Sprocket and Chain	6-8	—	6-59	
Engine Right Side	CVT Cover	6-9	6-51	6-58	
	Drive Belt	6-9	6-36	6-57	
	Primary Sheave/Secondary Sheave	6-9	6-30	6-57	
	CVT Housing/Clutch Outer Face	6-10	6-51	6-57	
	Clutch	6-10	6-28	6-56	
	Timing Chain	6-10	6-23	6-56	
Engine Center	Gear Position Bolt	6-11	—	6-56	
	Right Crankcase	6-11	6-52	6-56	
	Front Output Shaft Components	6-11	6-43	6-55	
	Driven Bevel Gear Components	6-11	6-43	6-55	
	Shift Cam	6-12	6-40	6-55	
	Guide Bar, Fork	6-12	6-39	6-55	
	Drive Bevel Gear Components	6-12	6-42	6-55	
	Main Transmission Shaft	6-12	6-38	6-54	
	Transmission Counter Shaft	6-12	6-38	6-54	
	Balancer Shaft	6-12	6-46	6-54	
	Crankshaft	6-13	6-27	6-54	
	Oil Pump, Pressure-limiting Valve	6-13	6-41	6-53	
	Left Crankcase		6-52		

Notes: Arrowhead direction is for engine removal orders. Reverse the direction for assembly and installation

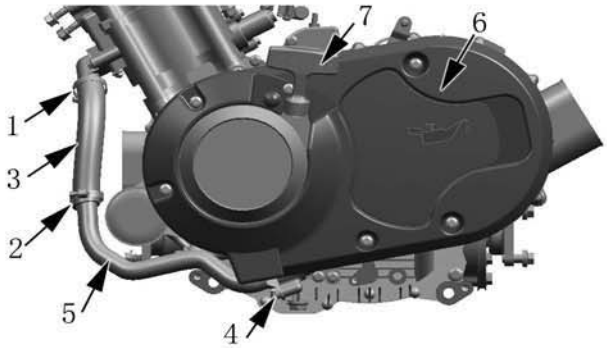
Engine Removal

ΔPreparation before engine removal

- Prepare a proper tray used for load of components
- Prepare necessary removal and assembly tools
- Drain up engine oil（→3-18）
- Drain up coolant（→ 3-20）

△ **Engine Periphery**

Water Hose/Pipe



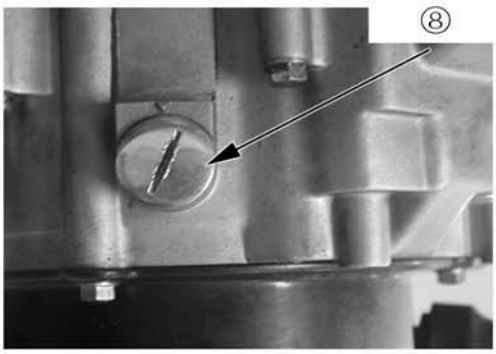
- Remove water hose clamp ①and②;
- Remove water hose③
- Remove screw④ and water hose⑤

Left Side Cover

- Remove 6 bolts(M6X20) of left side cover⑥
- Remove left side cover⑥

Recoil Starter

- Remove 4 bolts（M6X12）of recoil starter
- Remove recoil starter⑦



Inspection Plug

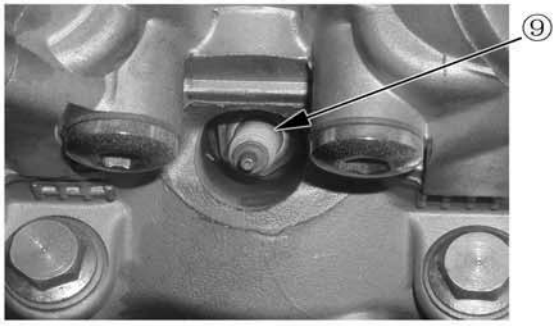
- Remove inspection plug with screwdriver

ΔEngine Front Side

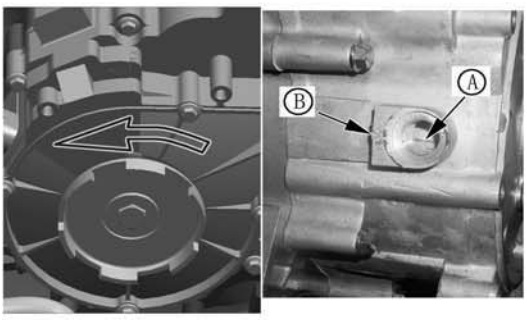
Spark Plug

- Remove spark plug with special wrench

  Tool: Spark Plug Wrench



- Turn crankshaft, align T.D.C. line A on magneto rotor with mark B of left crankcase

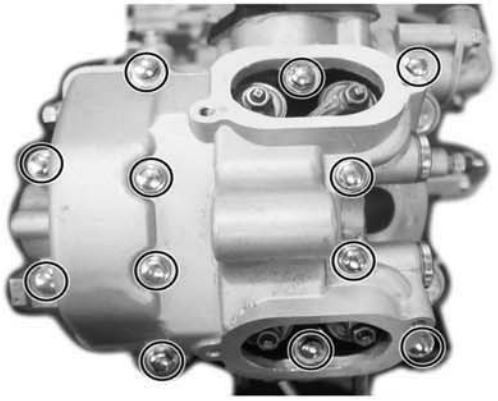


Cylinder Head Cover

- Remove valve adjusting cover

- Remove12 bolts of cylinder head cover

- Remove cylinder head cover



Timing Chain Tensioner

- Remove screw plug , insert a flat screwdriver into slot of timing chain tensioner adjuster , turn it clockwise to lock tensioner spring;

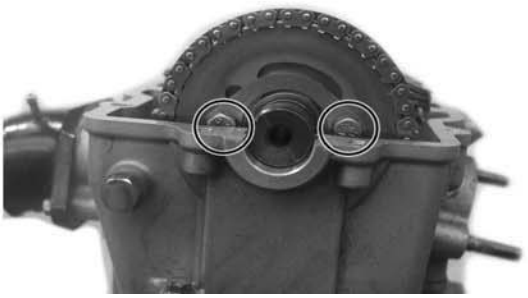
- Remove tensioner fix bolt

- Remove tensioner and gasket

Camshaft

- Loosen timing sprocket bolt;

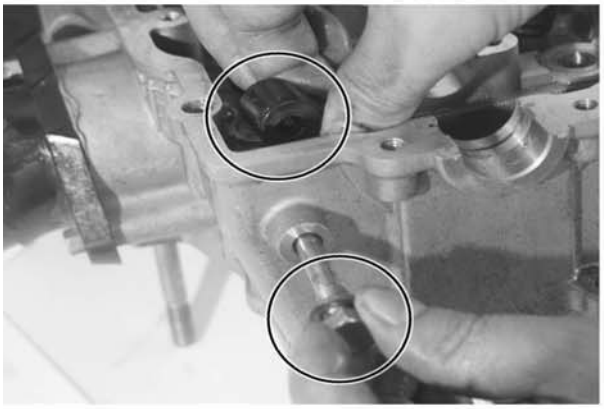
- Remove timing sprocket bolt and lock;



- Remove C-ring①
- Remove timing sprocket from camshaft, remove camshaft

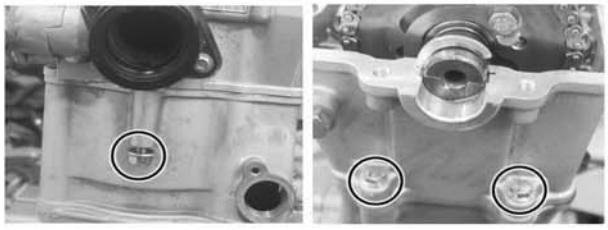
Note: Take care not to drop spacer, bolt, bolt lock and C-ring into crankcase.

- Remove tensioner plate

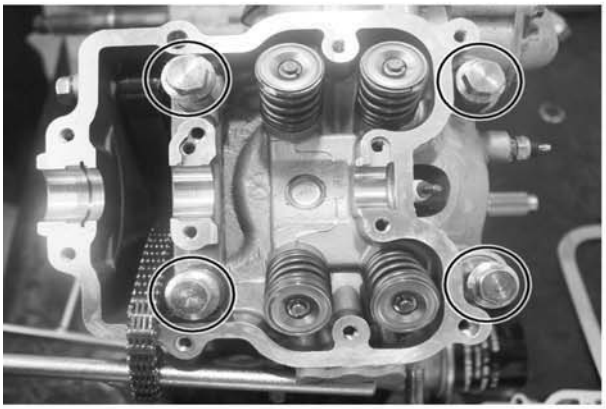


Cylinder Head

- Remove cylinder head bolt



- Remove cylinder head bolts diagonally;



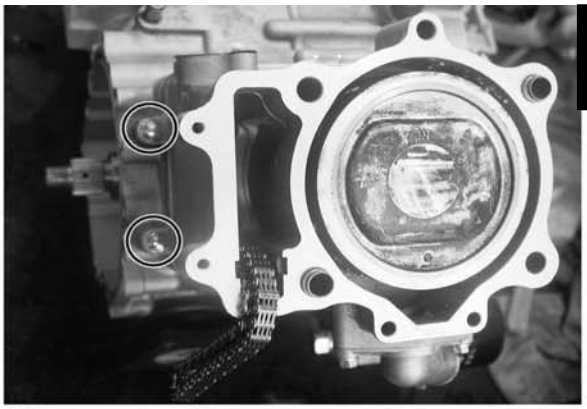
- Remove cylinder head

Note: Take care not to drop dowel pin into crankcase

Cylinder

- Remove dowel pin and cylinder head gasket
- Remove timing chain guide①

- Remove cylinder bolt
- Remove cylinder



Note：Take care not to drop dowel pin into crankcase

- Remove dowel pin and cylinder gasket

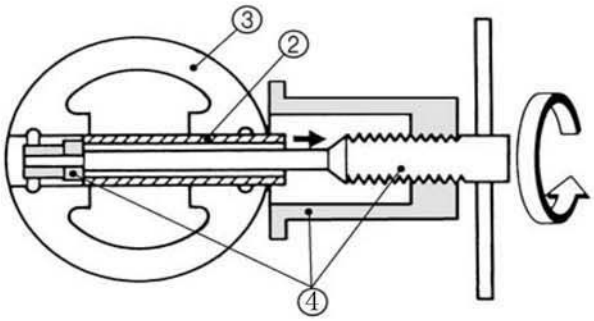
Note：When performing above removal process, be sure to hook up timing chain to prevent it from falling into crankcase

Piston

- Remove piston pin circlip①with long nosed pliers

Note: Put a clean rag under piston so as not to drop piston pin circlip into crankcase

- Remove piston pin②and piston③



Notes:

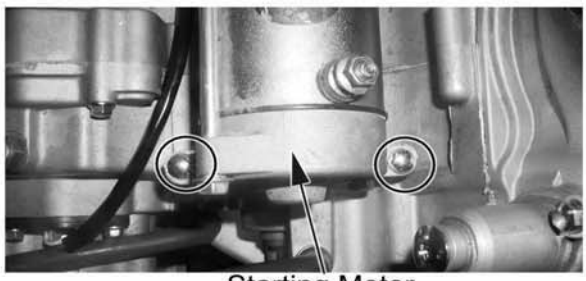
- When installing piston, make sure its identification conforms to that of cylinder;
- When removing piston pin, clean off burrs of piston pin hole and groove. If it's difficult to remove the piston, DO NOT hammer, use a special remover④

Tool: Piston Pin Remover

ΔEngine Left Side

Starting Motor

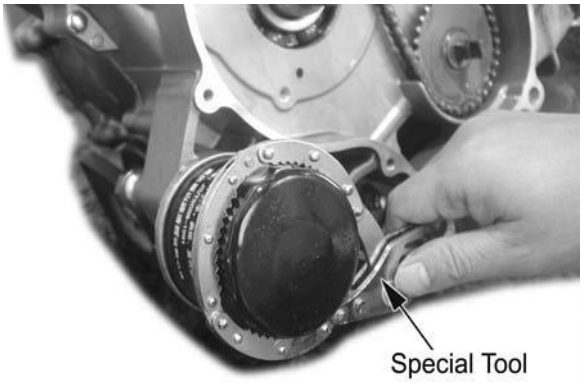
- Remove 2 bolts of starting motor
- Remove starting motor



Oil Filter

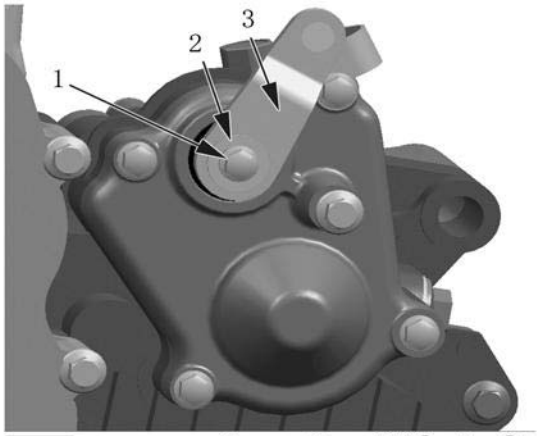
- Remove oil filter with special tools

Tool: Oil filter Remover

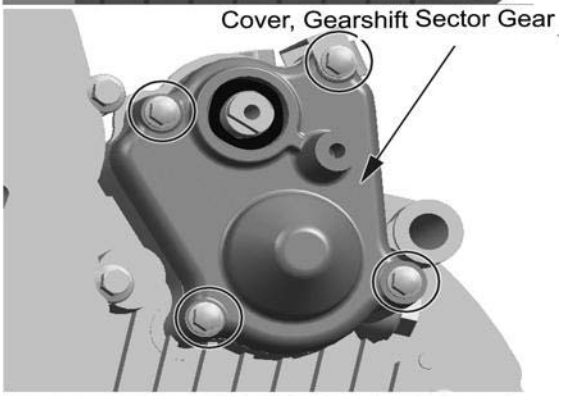


Sector Gear

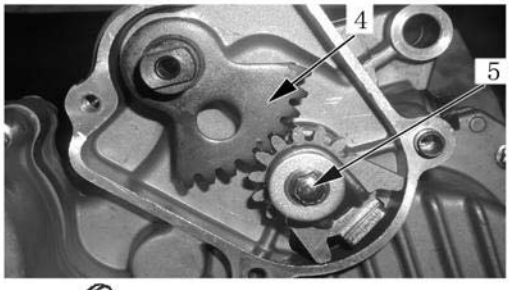
- Remove bolt 1 of gearshift rocker arm
- Remove gasket 2 and gearshift rocker arm 3



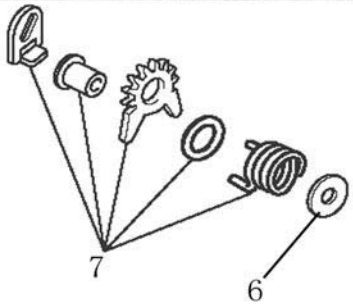
- Remove bolt of sector gear housing cover
- Remove wire clip and sector gear housing cover



- Remove dowel pin and gasket
- Remove drive sector gear 4
- Remove bolt 5 of driven sector gear

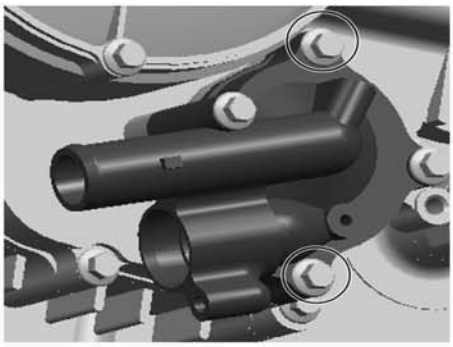


- Remove washer 6 and driven sector 7



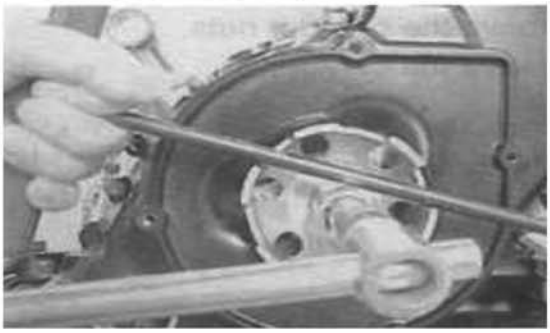
Water Pump

- Screw out bolt of water pump
- Remove water pump



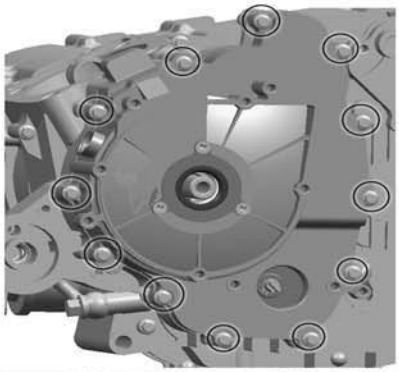
Sheave Drum

- Remove the sheave drum by using a suitable bar;
- Remove washer and sheave drum



Left Crankcase Cover

- Remove bolts;
- Remove left crankcase cover
- Remove dowel pin and gasket

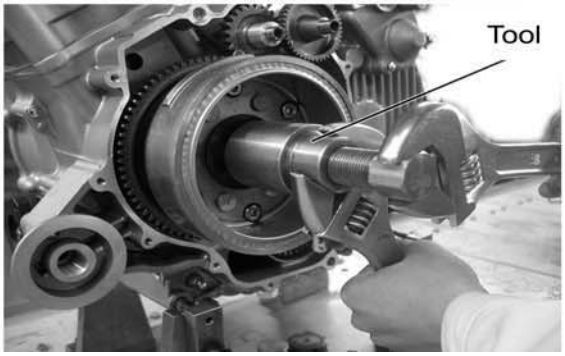


Magneto Rotor

- Install attachment 1 to crankshaft end

- Install special tool to rotor thread;
- Remove rotor and woodruff key

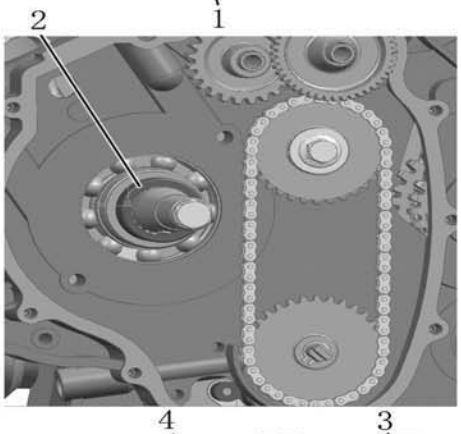
Tool: Rotor Remover



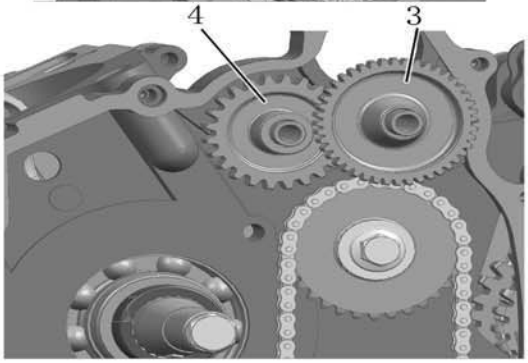
Starting Motor Gear

- Remove driven gear 1 and needle bearing

- Remove spacer 2

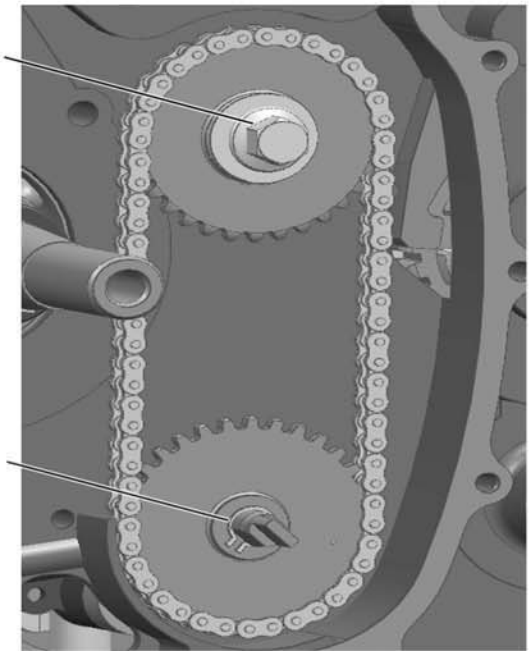


- Remove dual gear and shaft 3
- Remove idle gear and shaft 4



Oil Pump Sprocket and Chain

- Remove drive sprocket nut 5
- Remove C-ring 6
- Remove oil pump drive and driven sprockets and chain



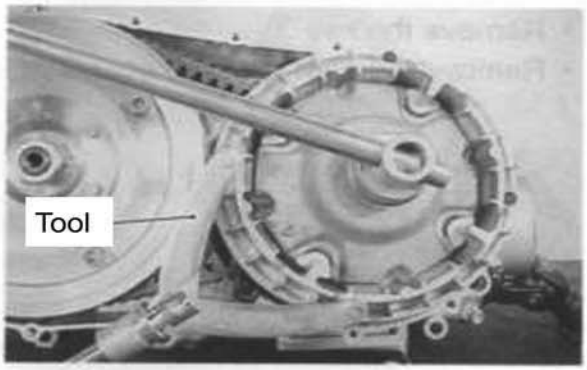
Δ Engine Right Side

CVT Cover

- Remove bolt of CVT cover
- Remove CVT cover
- Remove gasket and dowel pin

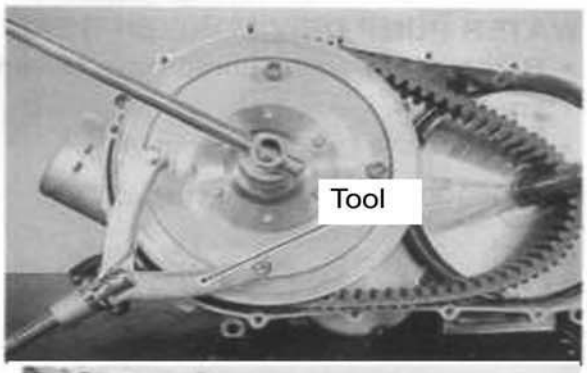
CVT(Continuously Variable Transmission)

- Remove primary sheave nut with special tool
- Remove primary sliding sheave

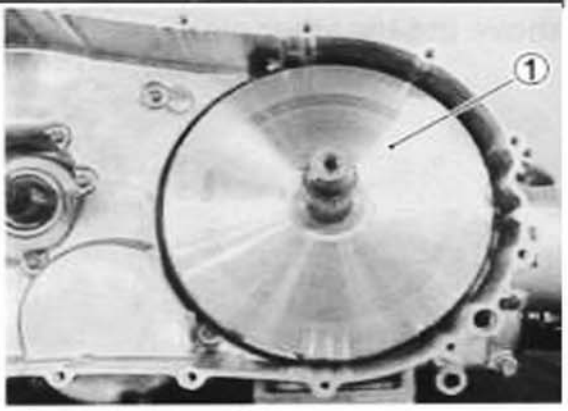


- Remove secondary sheave nut with special tools
- Remove secondary sheave
- Remove drive belt

Tool: Sheave Holder



- Remove primary fixed sheave ①

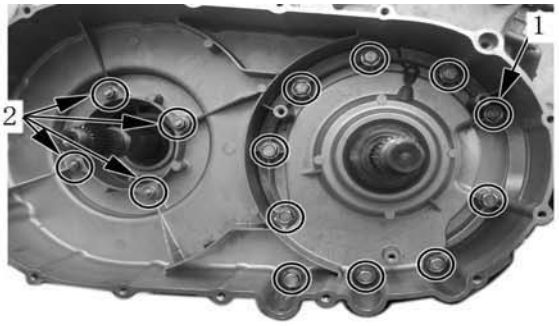


- Remove bolt for air guide plate.

- Remove air guide plate

CVT Case

- Remove bolt 1 of CVT case
- Remove nut 2 of CVT case



- Remove outer clutch face and CVT case

- Remove dowel pin, front and rear gasket

Clutch

- Remove one-way clutch

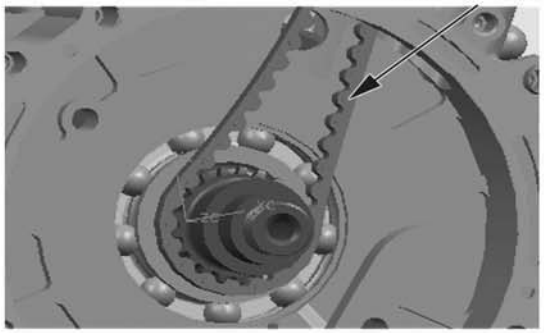
- Remove clutch shoe fixing nut with special tool

- Remove clutch shoe.

Note: The clutch shoe nut has left-hand threads.

Timing Chain

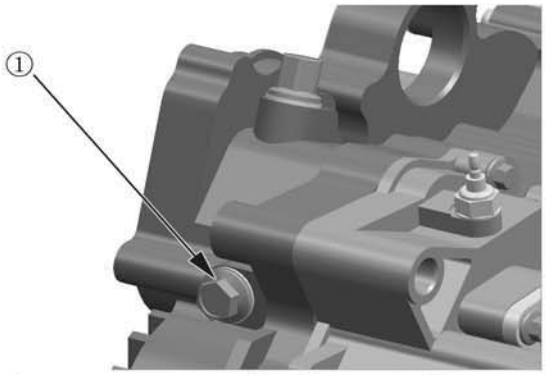
- Remove timing chain



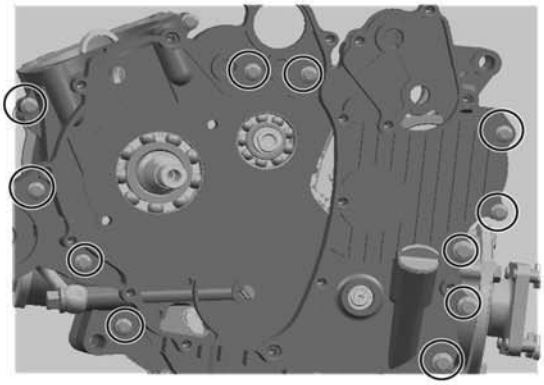
Engine Center

Gear position bolt

- Remove gear position bolt 1
- Remove spring and steel ball

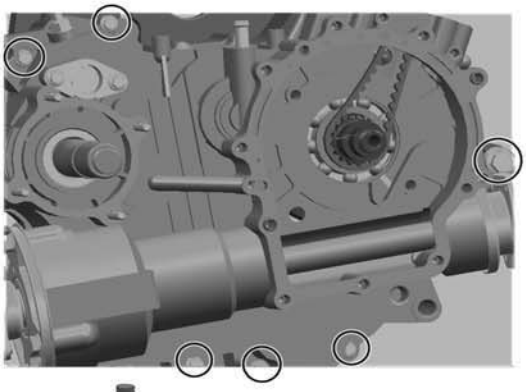


- Right Crankcase
- Remove left crankcase bolts
- Remove right crankcase bolts
- Separate right crankcase with special tool

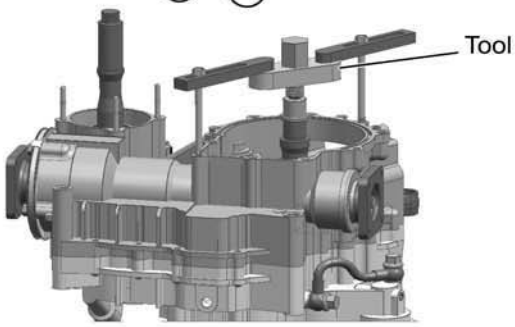


Caution

- The Crankcase separator plate should be parallel with the end face of crankcase
- Crankshaft should remain in the left crankcase half.

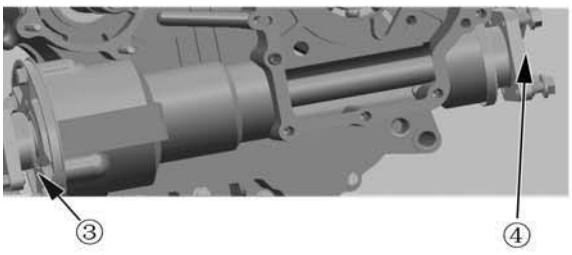


Tool: Crankcase separator

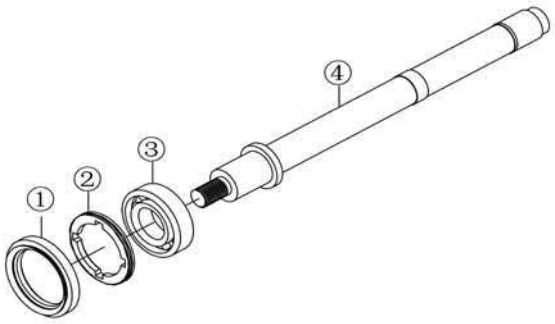


Driven Bevel Gear, Front Output Shaft

- Remove bevel gear cover bolt
- Remove driven bevel gear ③
- Remove front output shaft nut ④

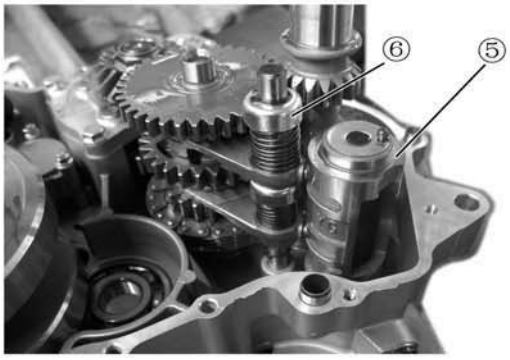


- Remove Oil seal①, Bearing limit nut①
- Remove Front Output Shaft ④



Shift Cam, Fork/Shaft

- Remove Shift Cam⑤, Fork /Shaft⑥

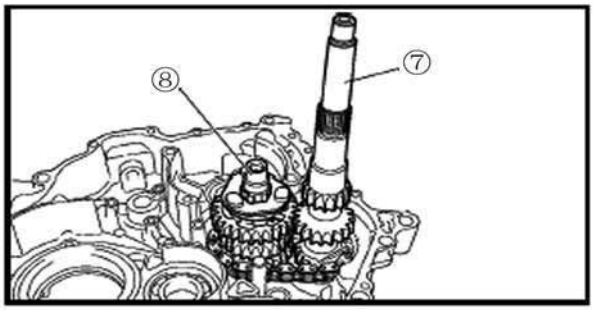


Drive Bevel Gear

- Remove left crankcase from driven bevel gear

Drive Shaft, Drive Shaft

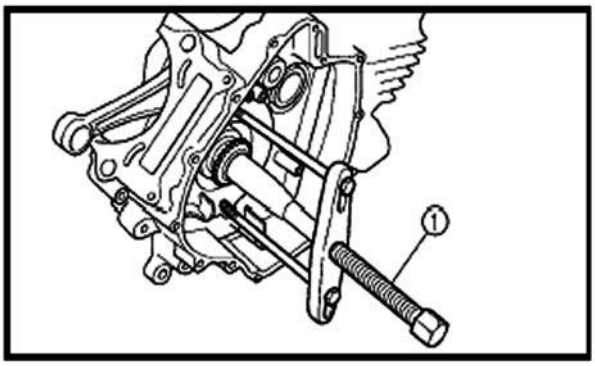
- Remove drive shaft⑦ and driven shaft⑦



Balancer Shaft

- Remove balancer shaft

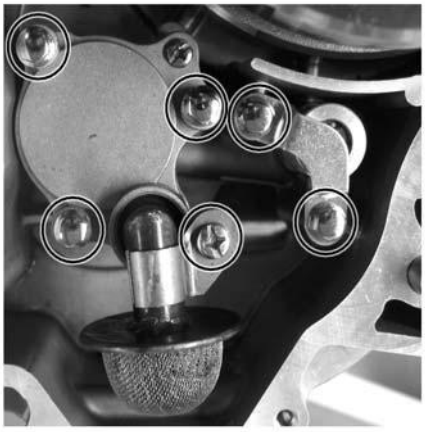
Crankshaft



- Separate crankshaft from left crankcase with Special tool

Tool: Crankshaft Separator

Oil bump, Relief Valve



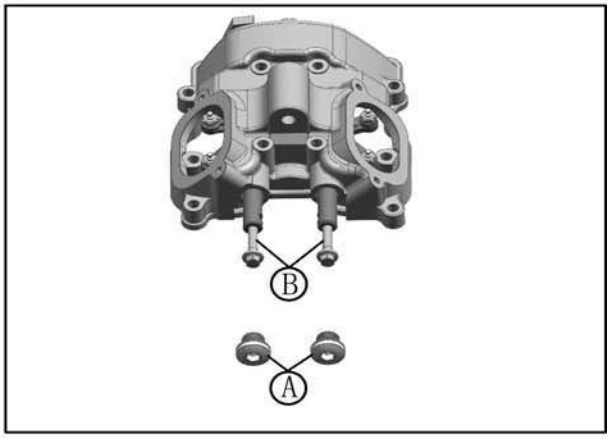
- Remove oil bump and relief valve

Engine Components Inspection

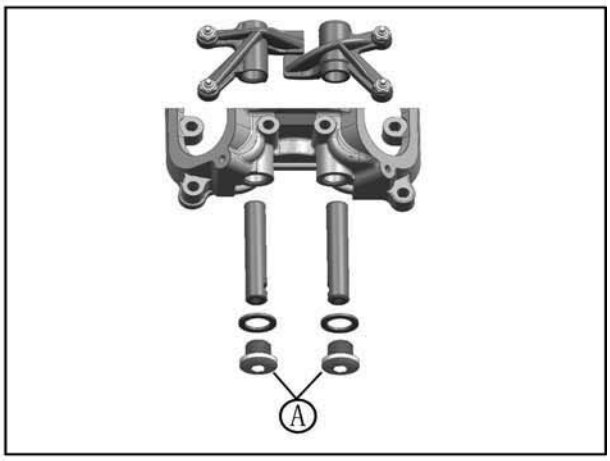
Cylinder Head Cover

Disassembly

Caution: Each removed part should be identified to its location, and the pars should be laid out in groups designated as “Exhaust”, “Intake”, so that each will be restored to the original location during assembly.

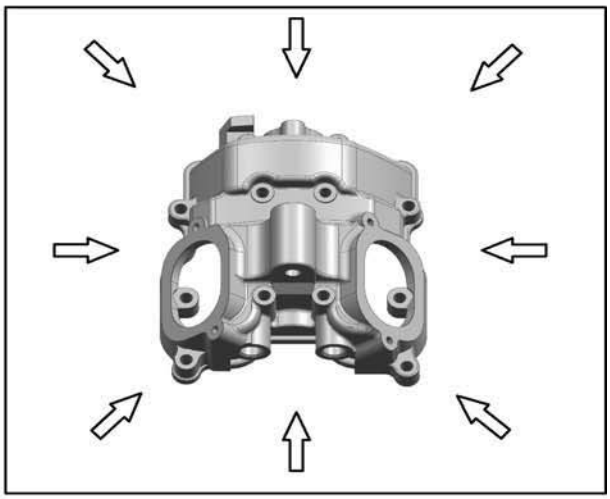


- Remove rocker arm shaft bolts A
- Remove rocker arm shaft by using M6 bolts B



Cylinder Head Cover Distortion

Clean off sealant from the fitting surface of cylinder head cover, place cylinder head cover on a surface plate and measure distortion with a thickness gauge.



Cylinder head Cover Distortion
Limit: 0.05mm
Tool: Thickness Gauge
Distortion out of range: → Replace

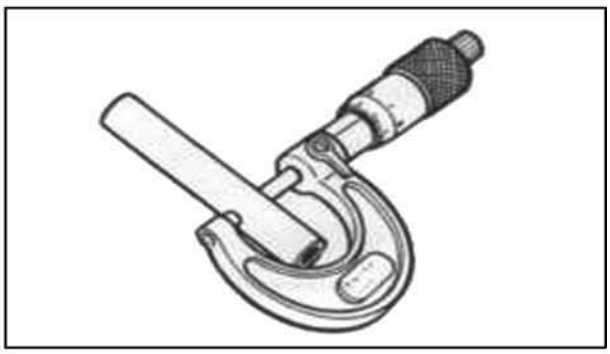
Note: Cylinder head cover and cylinder head should be replaced together.

Rocker Arm Shaft

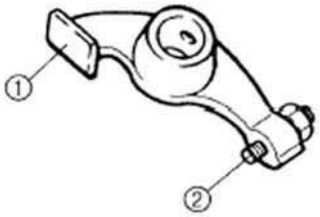
- Measure out diameter of rocker arm shaft with a micrometer.

Rocker Arm Shaft O.D.: (IN, EX)
Limit: 11.973~11.984mm

Tool: Micrometer (0~25mm)

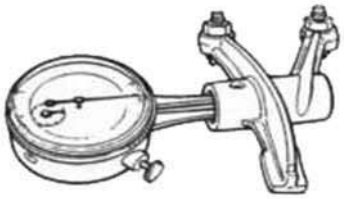


Rocker Arm



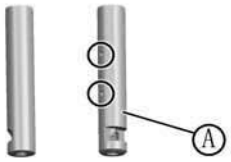
- When checking the rocker arm, check the inner diameter of the valve rocker arm and wear of the camshaft contact surface.
- **Rocker Arm I.D. :** .000~12.018mm

Tool: Dial Calipers



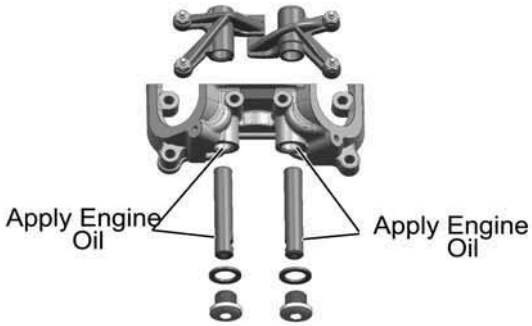
Assembly

Note: Intake rocker arm shaft A has oil holes.



- Apply engine oil to rocker arms and shafts;
- Install rocker arms and tighten rocker arm shaft to the specified torque:

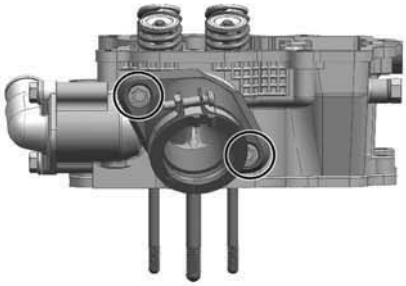
Rocker Arm Shaft Bolt: 28N.m



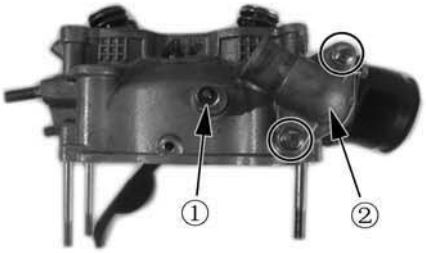
Cylinder Had

Disassembly

- Remove intake pipe



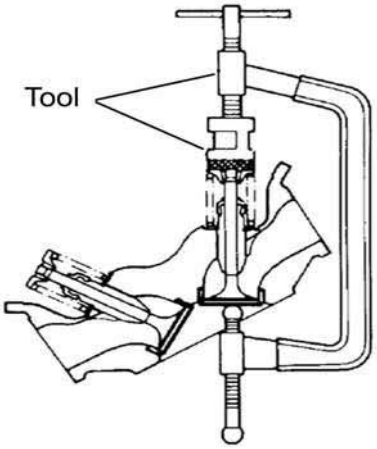
- Remove water temperature sensor①and thermostat cover ②



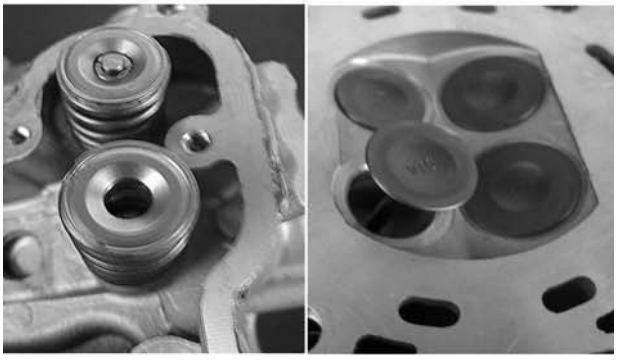
- Remove thermostat

- Compress the valve spring and remove valve cotter with tweezers.

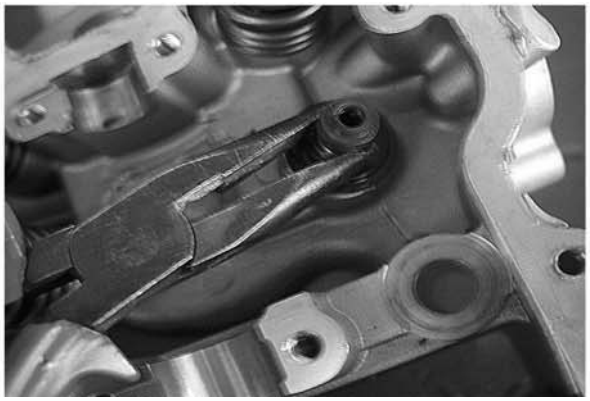
Tools: Valve Spring Compressor
Tweezers



- Remove valve spring upper seat and valve spring
- Remove valve from the other side.



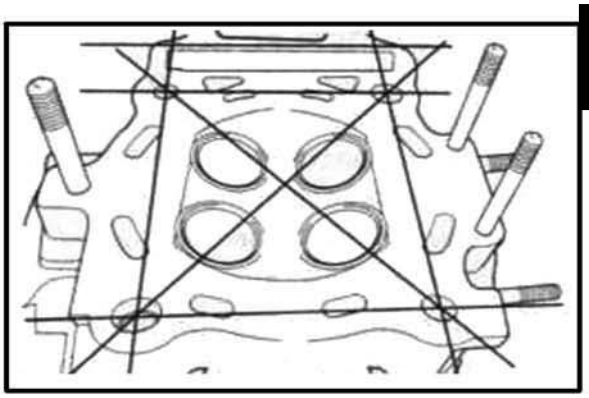
- Remove valve stem seal ring and valve lower seat



Cylinder Head Distortion

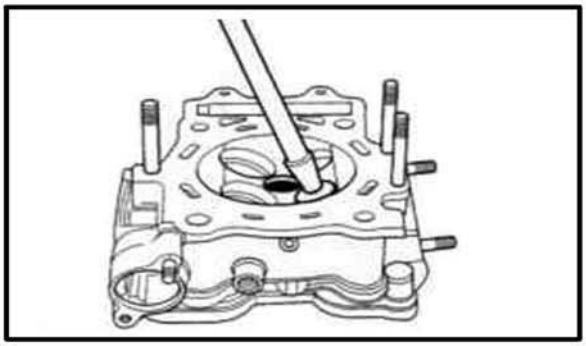
Clean off carbon deposit from combustion chamber; Check the gasket surface of the cylinder head for distortion with a straightedge and thickness gauge. Take clearance readings from several places. If any clearance reading is out of the service limit, replace with a new cylinder head.

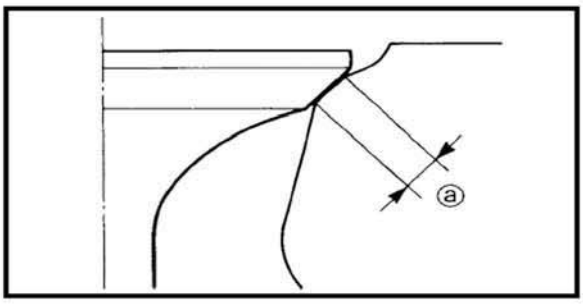
Cylinder Head Distortion Service Limit: 0.05mm
Tool: Thickness Gauge



Valve Seat Width

- Coat the valve seat with color uniformly. Fit the valve and tap the coated seat with the valve face in a rotating manner. To get a clear impression of the seating contact, use a valve lapper to hold the valve head.
- The ring-like dye impression on the valve face should be continuous, without any break. The width of the dye ring, which is the visualized seat width, should be within the following range:

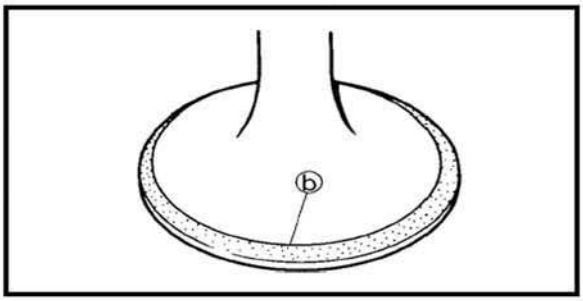


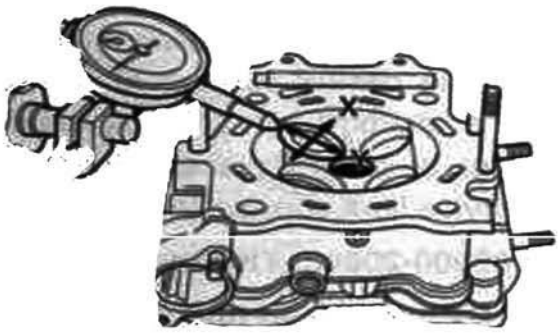


Valve Seat Width: 0.9-1.1mm
Tool: Valve Lapper

Valve Stem and Valve Guide

- Lift the valve about 10mm from valve seat. Check the valve stem deflection in the directions of X and Y perpendicular to each other, with a dial gauge. If the deflection measured is out of the limit, replace either the valve or the valve guide. (If the valve stem is worn to the limit and the clearance is found to be in excess of the limit, replace the valve. If the valve stem is within the limit, replace the valve guide. Double check the clearance after replacing the valve stem or the guide).





Valve Stem Deflection (IN & EX): 0.35mm
Tool: Micrometer
Magnetic Stand

Valve Stem O.D

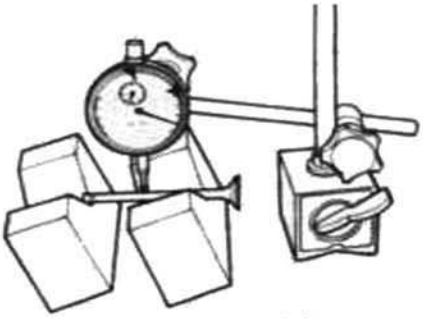
- Measure valve stem O.D with a micrometer

Service Limit
IN: 4.975-4.990mm
EX: 4.955-4.970mm
Tool: Micrometer (0-25mm)

Valve Stem Run-out

- Support valve stem with V block as illustrated on the right. Check the run-out with a dial gauge.

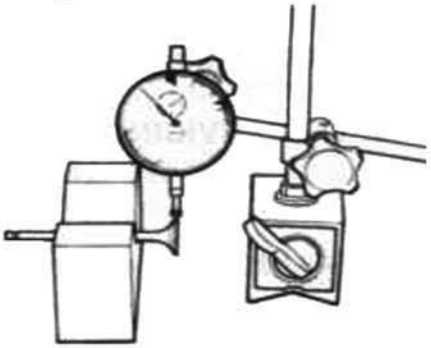
Service Limit: 0.05mm
Tool: Magnetism Stand
Dial Gauge (1/100)
V block



Valve Head Radial Run-out

- Measure the valve head radial run-out as illustrated on the right.

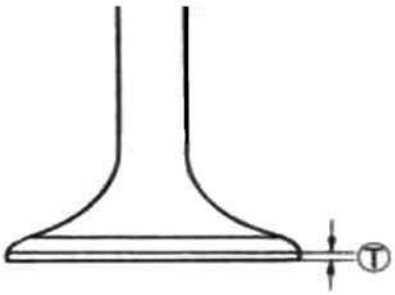
Valve head Radial Run-out out of range: →Replace
Service Limit: 0.03mm
Tool: Dial Gauge (1/100)
Magnetic Stand
V Block



Valve Face Wear

- Check each valve face for wear or damage. Replace valve with a new one if it is found to have abnormal wear. Measure valve head thickness T.

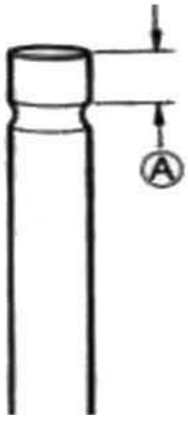
Valve head thickness T out of range: → Replace
Service Limit: 0.5mm
Tool: Vernier Caliper



Valve Stem End

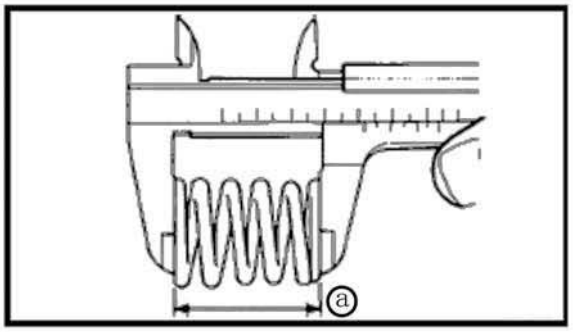
- Check valve stem end for pitting or wear. In case of any pitting or wear, resurface the valve stem end. If the length T is less than service limit, replace valve with a new one.

Valve Stem End Length
Service Limit: 2.1mm
Tool: Vernier Caliper



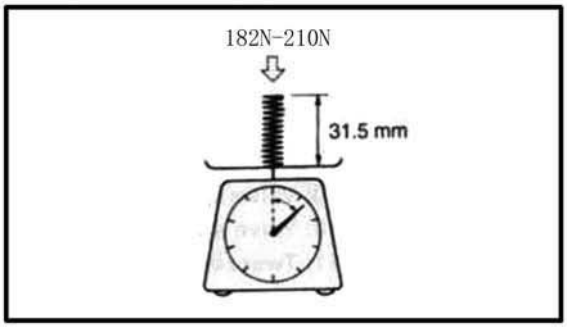
Valve Spring

- Valve Spring keeps valve and valve seat tight. Weakened spring results in reduced engine power output and chattering noise from valve mechanism.



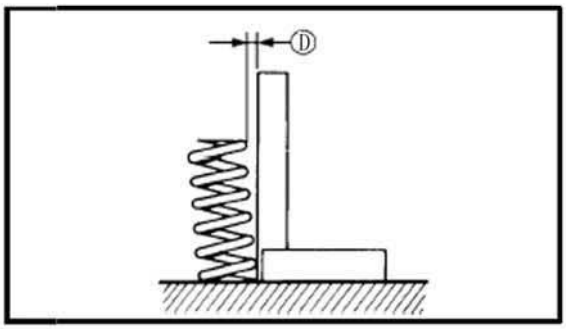
- Measure the spring free length.

Spring free length out of range: →Replace
Service Limit: 38.8mm
Tool: **Vernier Caliper.**



- Measure the force to compress the spring to the specified length.

Valve spring tension out of range: → Replace
Service Limit: (IN/EX)
182N-210N/31.5mm
Tool: Spring Scale.

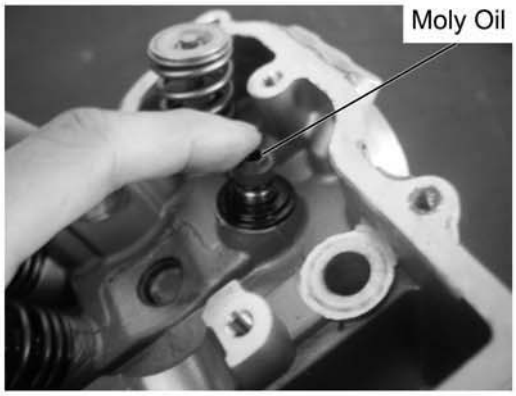


- Measure valve spring incline.

Spring incline out of range:→ Replace
Valve Spring Incline Limit: 2.5º/1.7mm

Assembly of Cylinder Head

- Install each valve spring seat;
- Apply moly oil to valve stem seal and fit into position.

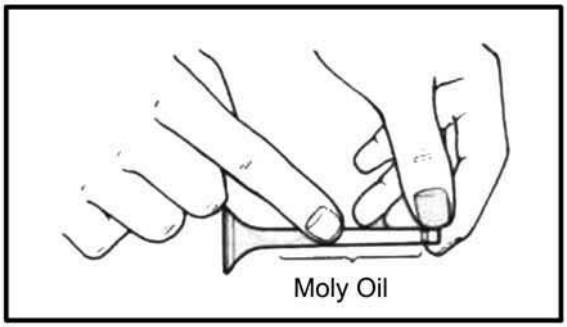


Material: Moly oil

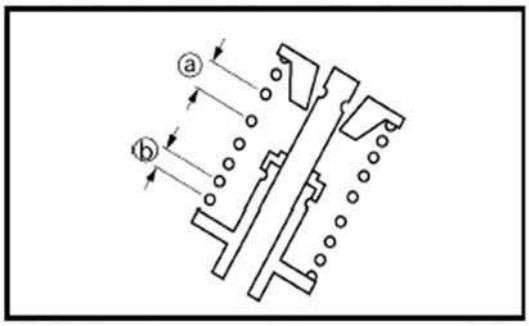
> **Note:** Do not reuse the valve stem seal.

- Insert the valves, with stems coated with moly oil all around.

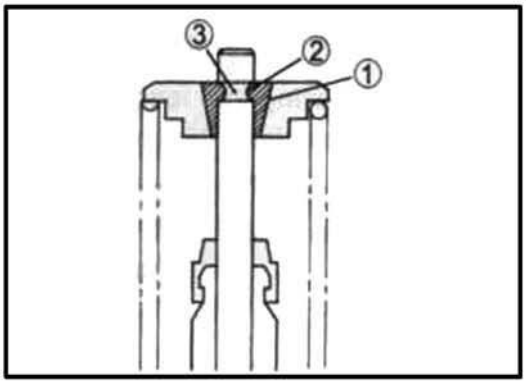
> **Note:** When inserting the valve, be careful not to damage the lip of the stem seal.



- Install valve spring with small-pitch end “b” facing cylinder head. Big-pitch end “a” is marked.

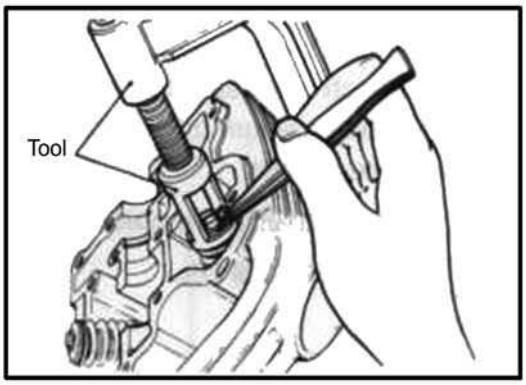


- Put on the valve spring retainer. Use the valve spring compressor to press down the spring. Fit the two cotter halves to the stem end and release compressor to allow the cotter ① to wedge in between seat and stem. Make sure that the rounded lip② of the cotter fits into the groove③ in the stem end.

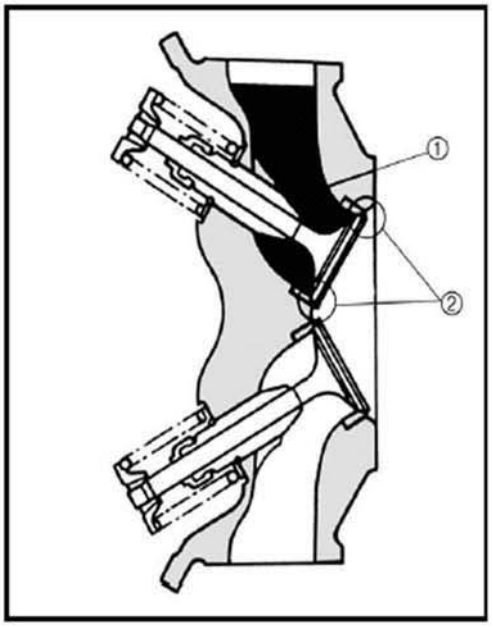


Tool: Valve Spring Compressor
Tweezers

NOTE: Knock the valve end with rubber hammer. Make sure valve cotter is fit into groove.



- Check the sealing effectiveness of cylinder head. Dip clean solution into valve IN/EX ① and check for any leakage of valve seat ② after a few minutes.

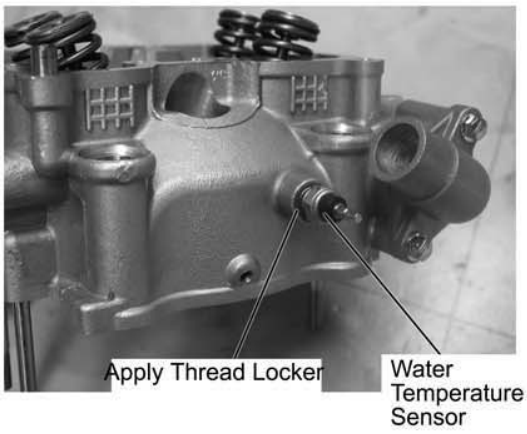


- Install thermostat

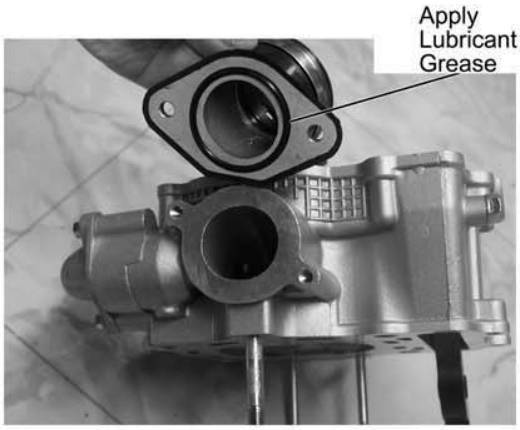
- Install thermostat cover

- Install water temperature sensor, apply thread locker to the thread part, tighten it to the specified torque.

Water temperature sensor
Tightening torque: 10 N·m

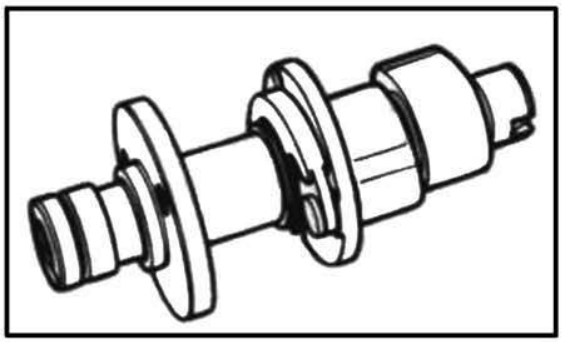


- Install intake pipe, apply lubricant to 0-ring.



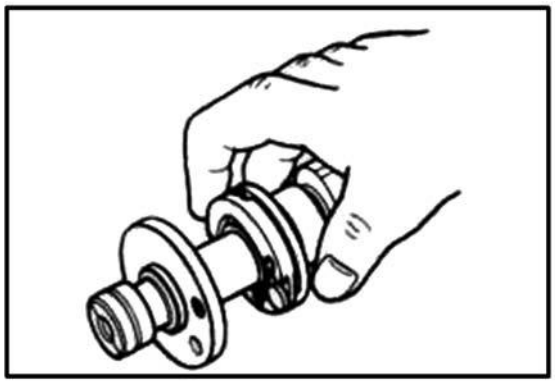
Camshaft

Check camshaft for wear and run-out of cams and journals if the engines produces abnormal noise or vibration or lacks power output. Any of these symptoms could be caused by wear of camshaft.



Automatic Decompression

- Move the automatic decompression weight with hand and check if it is operating smoothly. If it is not working smoothly, replace with a new camshaft/automatic decompression assembly.



Cam Wear

Worn cams can often cause mistimed valve operation resulting in reduced power output. The limit of cam wear is specified for both IN and EX cams in terms of cam height "a". Measure with a micrometer the cam height.

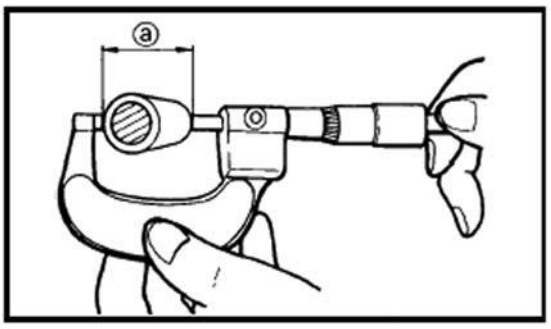
Cam height out of range: →Replace

Cam height service limit:

IN: 33.130mm

EX: 33.200mm

Tool: **micrometer (25-50mm)**



Camshaft Journal Wear

- Check whether each journal is worn to the limit by measuring camshaft journal oil clearance with the camshaft installed.

Camshaft journal oil clearance

Service limit: 0.15mm

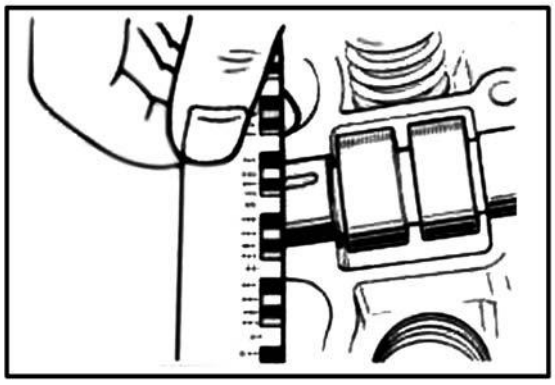
Check according to the following steps:

- Clean off materials from cylinder head and cover;
- Install camshaft with plastic gauge;
- Install cylinder head cover and tighten bolts evenly and diagonally to the specified torque:

Tightening torque: 10 N·m

- Remove cylinder head cover, read the width of the compressed plastic gauge with envelop scale. The reading should be taken from the widest part.

Tool: Plastid Gauge



Note: Do not turn the camshaft with plastic gauge in place.

If the camshaft journal oil clearance exceeds the limit, measure the outer diameter of camshaft;

Replace either cylinder head set or the camshaft if the clearance is not correct.

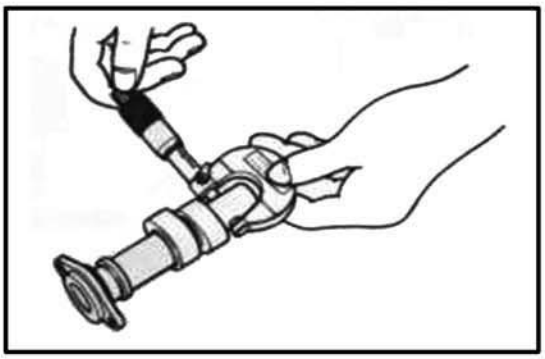
Camshaft Journal O.D.

- Measure camshaft journal O.D. with a micrometer. If the O.D. is out of range, replace camshaft with a new one.

Camshaft journal O.D. service limit:

Sprocket end: 22.959 mm—21.980mm
Other end: 17.466mm—17.484mm

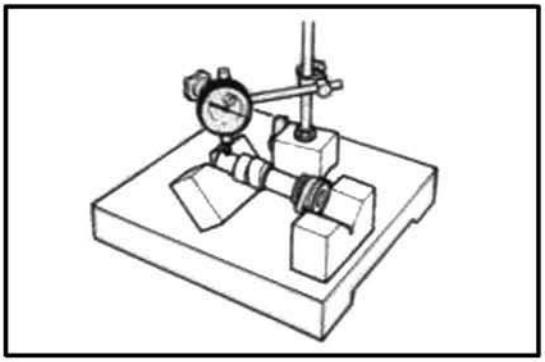
Tool: micrometer (0-25mm)



Camshaft Run-out

- Measure the run-out with a micrometer. Replace camshaft is the run-out is out of range.

Service limit: 0.10mm



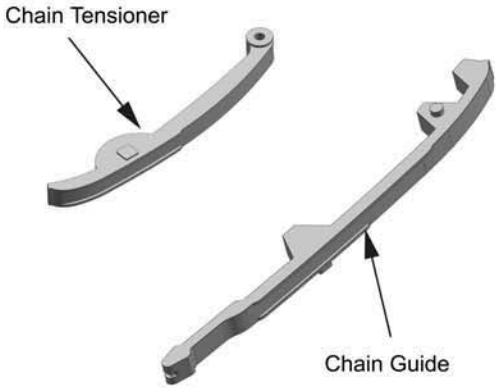
Timing Sprocket and Chain

- Check timing sprocket and chain for wear or damage.
- Replace with new parts if abnormal wear or damage is found.

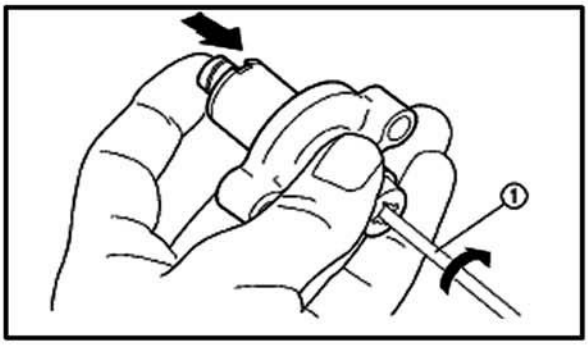
Tensioner and Chain Guide

Check contact surface of tensioner and chain guide for wear and damage.

Replace with news parts if abnormal wear or damage is found.



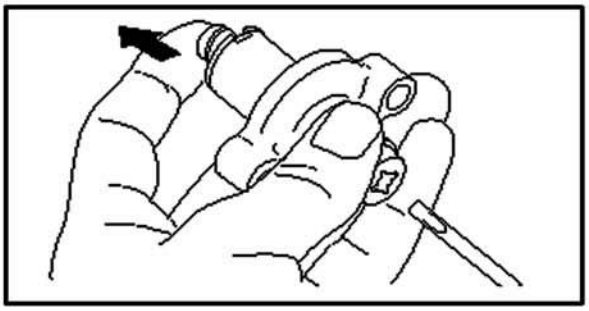
Chain Tensioner
Inspection



- Check tensioner for any damage or poor function.

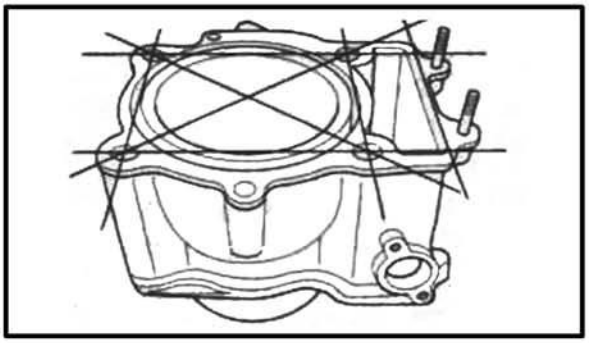
  Damage, poor function: →Replace

- Insert screw driver into the slotted end of adjusting screw, turn it clockwise to loosen the tension and release the screwdriver.
- Check the push rod movement. If the push rod is stuck or there is a failure with spring mechanism, replace the chain tensioner with a new one.

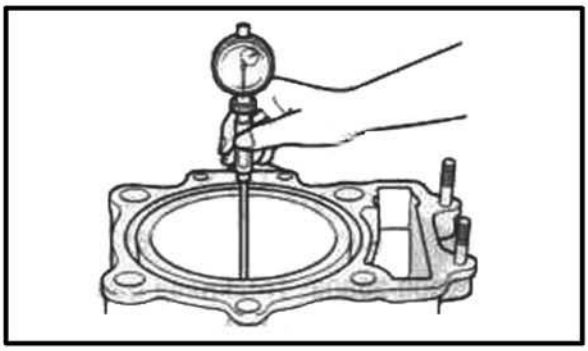


Cylinder
Cylinder Distortion

- Check the gasket face of cylinder for distortion with a straightedge and thickness gauge and take clearance readings at 7 points as illustrated. If the largest reading at any of the 7 points of the straightedge is out of the range, replace the cylinder.

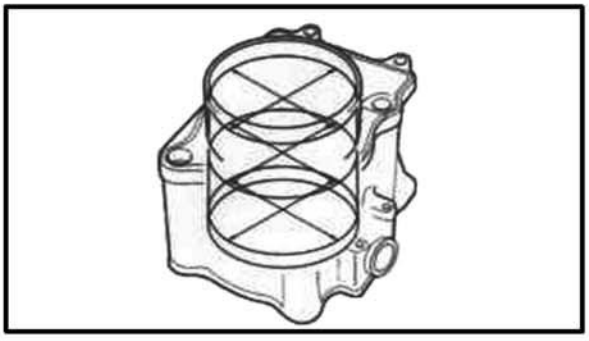


Cylinder Distortion Service Limit: 0.05mm
Tool: Straightedge
Thickness Gauge



Cylinder Bore

- Check cylinder wall for scratches, nicks or other damage. Replace with a new one if any.
- Measure cylinder bore diameter at three points of upper, middle and lower.



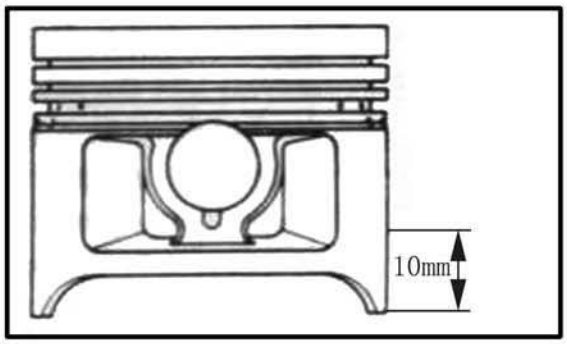
Standard Cylinder Bore: 87.500-87.522mm
Tool: Cylinder Gauge Set

Piston

Piston Diameter

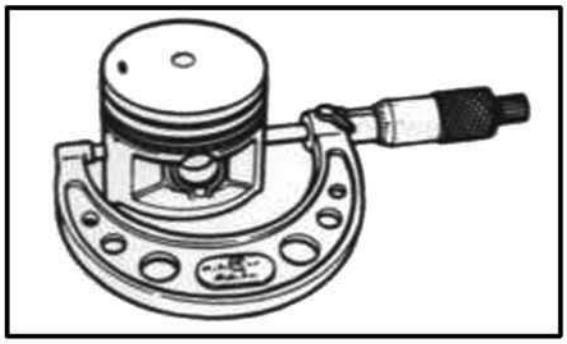
- Use a micrometer to measure the diameter at the point 10mm above the piston end, as illustrated on the right. If the measurement is less that the limit, replace the piston

Standard: 87.460-87.480mm
Limit: 87.380mm



Tool: Micrometer (75-100mm)

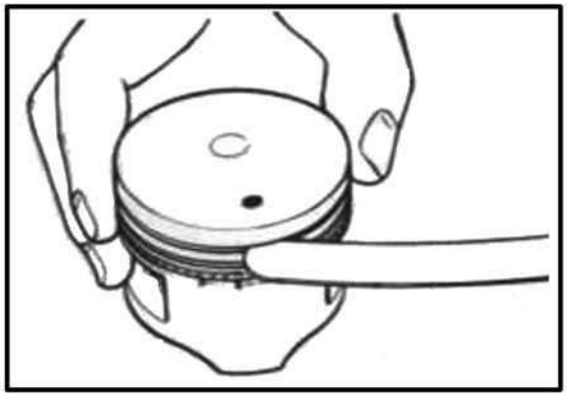
- Calculate the piston to cylinder clearance according to the above measurement.
- If the clearance is more than 0.15mm, replace the cylinder or piston, or both.

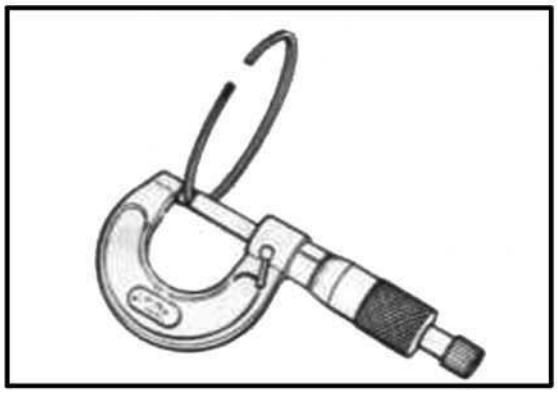


Piston Ring to Groove Clearance

- Use a thickness gauge to measure the side clearance of top^{t} ring and 2nd ring.
- If the clearance exceeds the limit, replace both piston and piston rings.

Service Limit:
Top ring: 0.18mm
2nd ring: 0.15mm

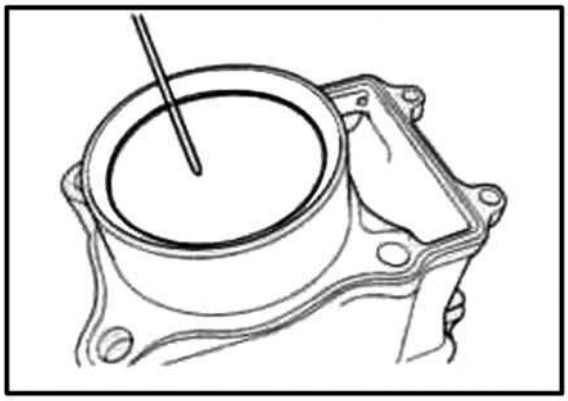




Piston Ring Free End Gap and End Gap

- Before installing piston rings, use vernier caliper to measure the free end gap of each ring, and then fit ring into the cylinder.
- Use thickness gauge to measure each ring end gap, if any ring has an excess end gap, replace the piston ring.

Piston ring free end gap limit:
Top ring: 8.9mm
2nd ring: 9.5mm

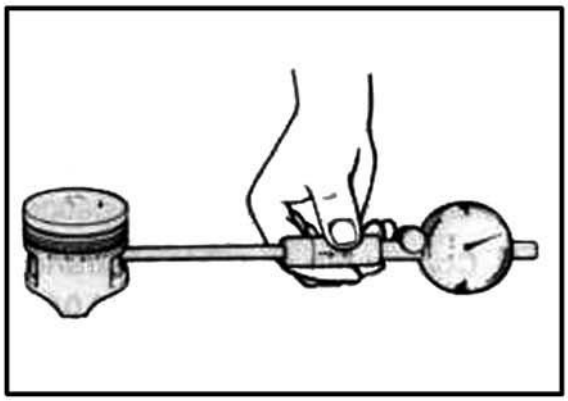


Piston ring end gap limit:
Top Ring: 0.60mm
2nd ring: 0.60mm

Tool: Vernier caliper
Thickness gauge

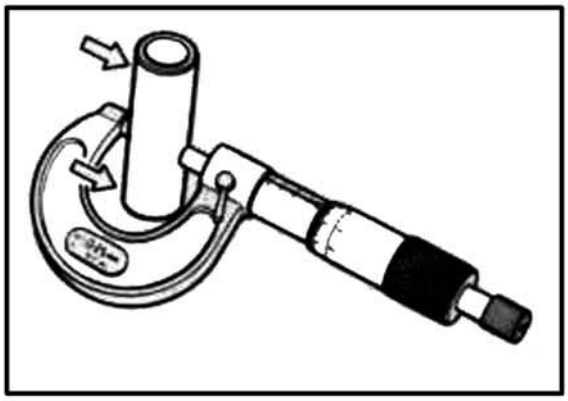
Piston Pin and Pin Bore

- Use a bore gauge to measure the inner diameter of piston pin bore.
- Use micrometer to measure outer diameter of piston pin.
- If out of limit, replace both piston and piston pin.



Piston pin bore limit: 23.030mm

- Use micrometer to measure piston pin outer diameter at three points



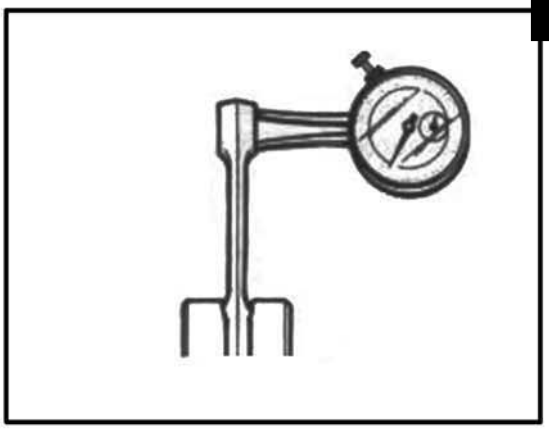
Piston pin outer diameter limit: 22.980mm
Tools: Bore gauge (18-35mm)
Micrometer (0-25mm)

Connecting Rod/Crankshaft

Connecting rod small end I.D.

- Use a dial gauge to measure the I.D. of connecting rod small end. If the measurement exceeds the limit, replace the connecting rod.

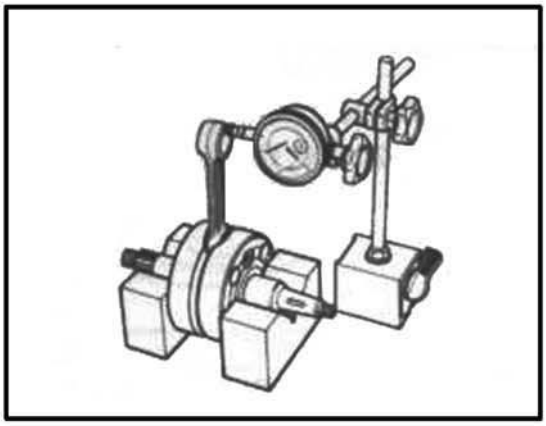
Connecting rod small end I.D. : 23.040mm
Tool: Dial Gauge (18-35mm)



Connecting Rod Deflection

- Check the movement of the small end of the rod and inspect the wear of the small end. This method is also applicable to check and inspection of big end.

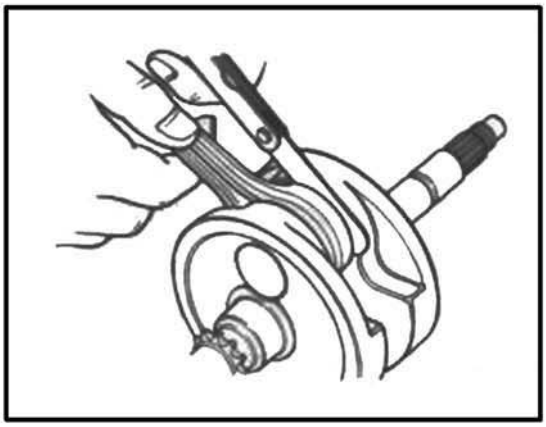
Connecting Rod Deflection: 3.0mm
Tools: Dial Gauge
Magnetic stand
V-block



Connecting Rod Big End Side Clearance

- Push the big end to one side, and use thickness gauge to measure the other side clearance.
- If out of limit, replace with a new crankshaft.

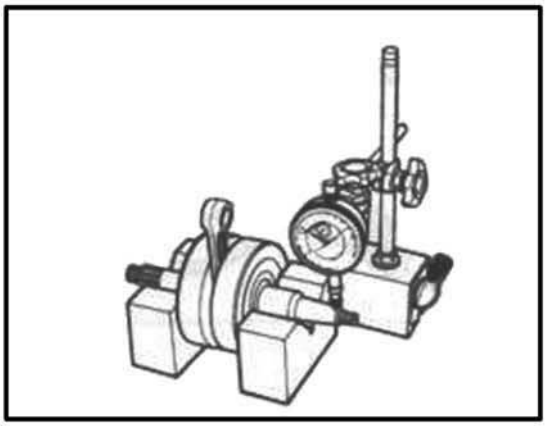
Connecting Rod big end side clearance: 1.0mm
Tool: Thickness Gauge



Crankshaft Run-out

- Support crankshaft with “V” blocks as illustrated. Put the dial gauge, slowly turn the crankshaft and measure run-out with a dial gauge.
- If the run-out exceeds the limit, correct or replace the crankshaft.

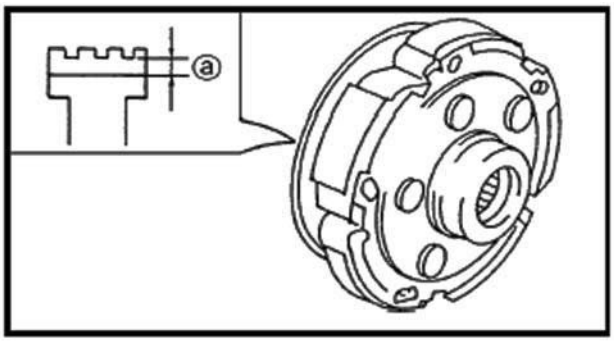
Run out limit: 0.08mm
Tools: dial gauge
Magnetic stand
V-block



Clutch

Clutch Shoes

- Check clutch for chipping, scrape, uneven wear or heat discoloration. At the same time check depth of the grooves of clutch shoes. If any of the clutch shoes has no groove, replace the clutch.



Note: clutch should be replaced as a set.

Clutch Wheel

Check the inner clutch wheel ① for scratches, scuffs or blue discoloration or uneven wear. If any damage is found, replace the clutch wheel with a new one.

- Check oil seal lip for wear or damage.

Wear or Damage: →Replace

- Use special tool to remove oil seal

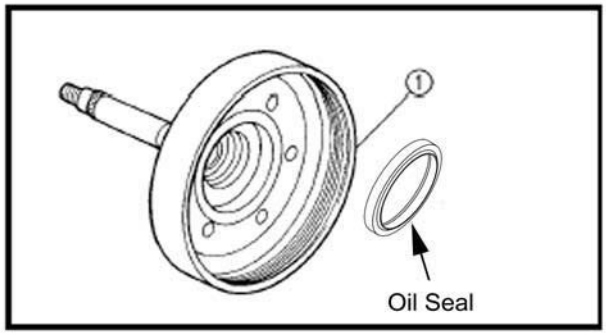
Tool: Oil seal remover

- Use special tool to assemble oil seal

Tool: Oil seal installer set

- Check the turning of bearing.

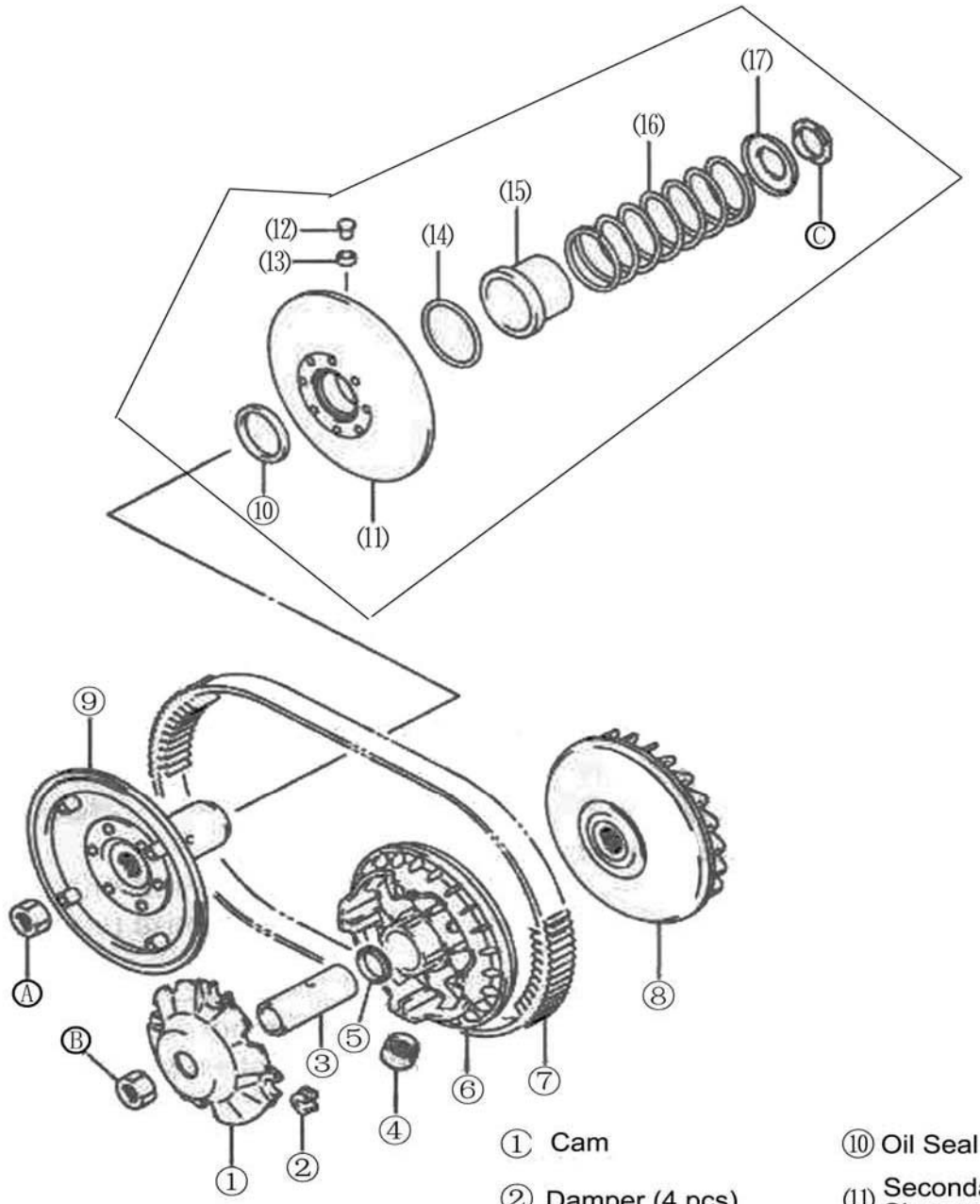
Abnormal damage: →Replace



Assembly

- Apply lubricant grease to oil seal when assembling.

Primary and Secondary Sheave



Ⓐ Nut, Primary Sheave
Ⓑ Nut, Secondary Sheave
Ⓒ Ring Nut, Secondary Sheave

	N • m
A	115
B	115
C	100

① Cam
② Damper (4 pcs)
③ Spacer
④ Roller (8 pcs)
⑤ Oil Seal (2 pcs)
⑥ Primary Sliding Sheave
⑦ Drive Belt
⑧ Primary Fixed Sheave
⑨ Secondary Fixed Sheave
⑩ Oil Seal (2 pcs)
(11) Secondary Sliding Sheave
(12) Guide Pin (4 pcs)
(13) Spacer (4 pcs)
(14) O-ring (2 pcs)
(15) Spring Seat
(16) Spring
(17) Spring Plate

Primary Sliding Sheave

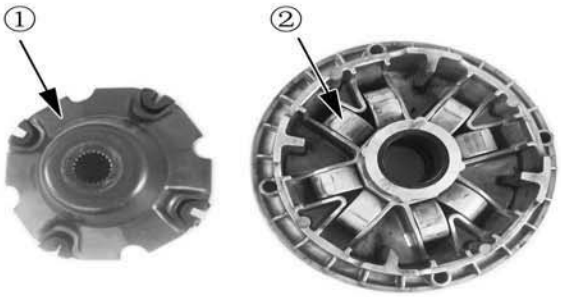
Disassembly

- Remove spacer
- Remove Cam ①and Roller②

Roller

- Check each roller and sliding face for wear and damage.

Wear and damage: →Replace



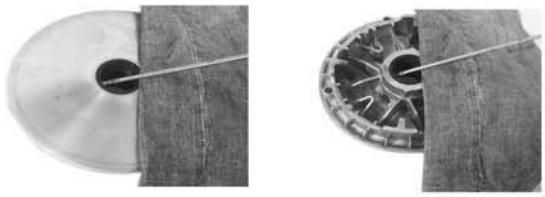
Note: rollers should be replaced as a set.

Oil Seal

- Check oil seal lip for wear and damage.

Wear and damage: →Replace

- Remove the oil seal



Primary Sliding Sheave and Fixed Sheave

- Check the drive face for any abnormal conditions such as damage or stepped wearing.

Damage or wearing: → Replace

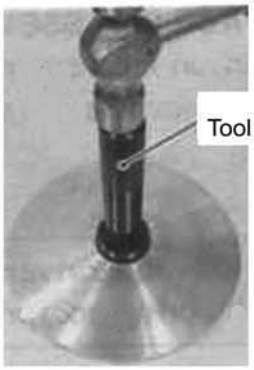
- Install oil seal with special tool.

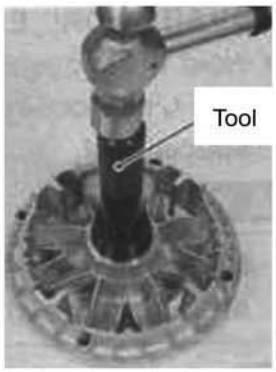
Tool: Bearing install set

Assembly

Reverse the removal procedure of primary sliding and fixed sheave for installation.

Pay attention to the following:

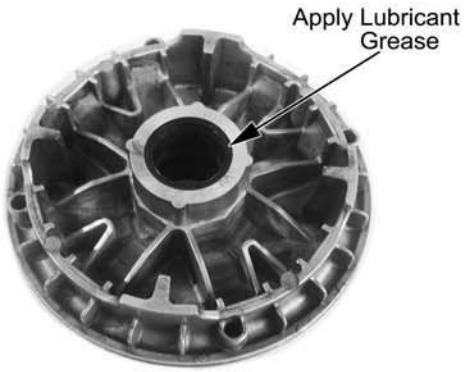




- Apply grease to inner bore and oil seal lip.

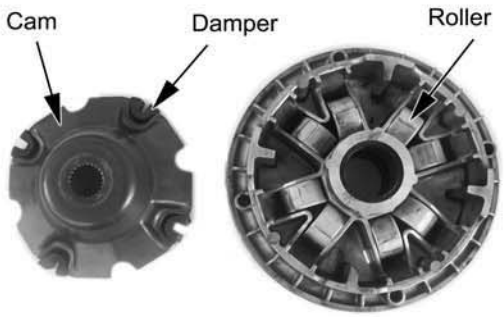
> **Note:**
> Wipe off any excessive grease thoroughly.
> Take care not to attach any lubricant grease to contact surface of drive belt.

Material: Lubricant grease



- Position 8 rollers ①on the primary sliding sheave
- Install 4 dampers ② to cam ③
- Install cam to primary sliding sheave.

> **Notes:**
> When inserting the spacer, press down the cam so that the rollers will not come out of position.



Install spacer

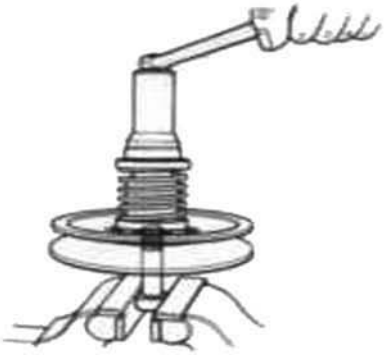
Secondary Sheave

Disassembly

- Use special tool and holder to hold the secondary sheave. Remove secondary sheave nut with special tool.

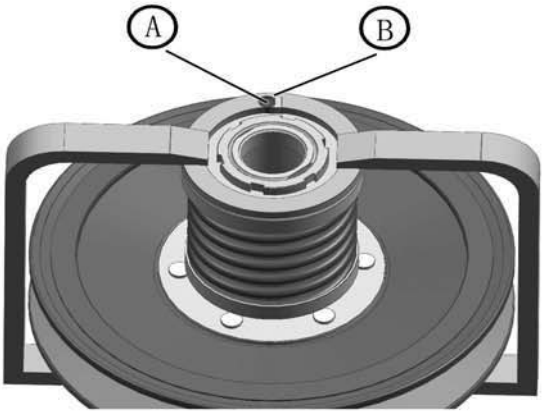
Caution:
Do not remove the ring nut before attaching the clutch spring compressor.

Tool: Nut Wrench
Sheave Holder



- Attach special tool to the secondary sliding sheave and compress it by turning in the tool handle.

Note:
Make sure that spring end A is inserted into slot B of the tool handle.

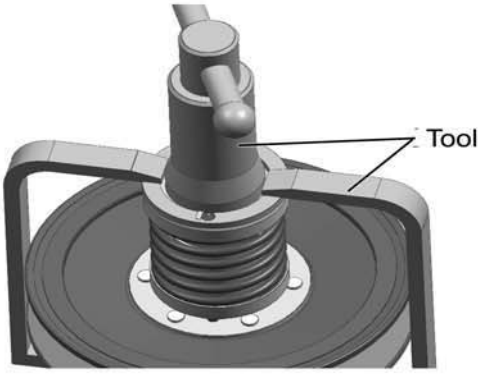


- Remove ring nut.

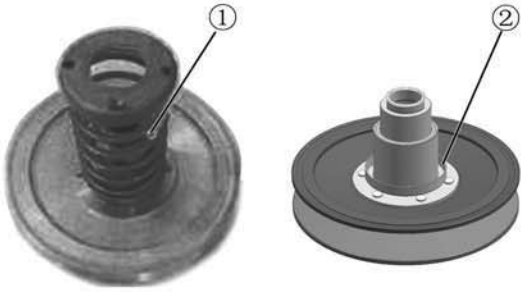
Tool: Secondary sliding sheave spring compressor

Note:
Since a high spring force applies to the secondary sliding sheave, take special care that the secondary sliding sheave will not come off abruptly.

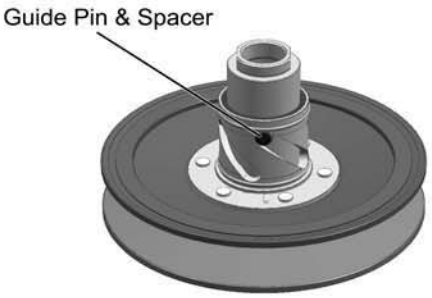
- Slowly loosen tool handle and remove the special tool.



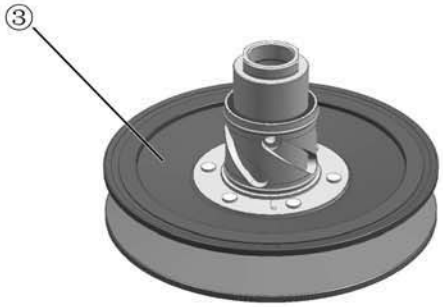
- Remove spring ①
- Remove spring seat ②.



- Remove guide pin and spacer.

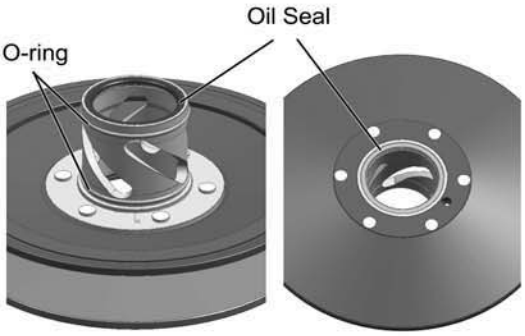


- Remove secondary sliding sheave③



O-ring and Oil Seal

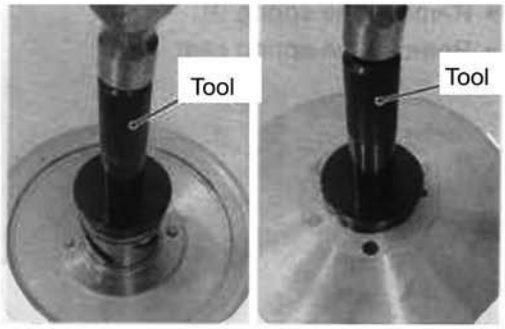
Check the O-ring and oil seal for wear and damage.
Wear and Damage: → Replace



- Remove Oil Seal

- Install oil seal with special tool.

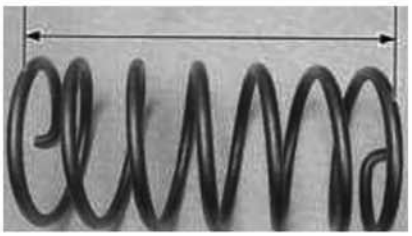
Tool: Bearing install set



Secondary Sheave Spring

- Use vernier caliper to check the spring free length. If xthe length is shorter than the service limit, replace with a new one.

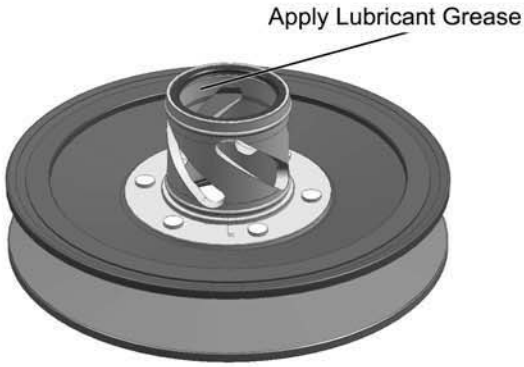
Service Limit: 145.4mm



Secondary Sliding and Fixed Sheave

- Check drive face for any abnormal condition such as stepped wear or damage.

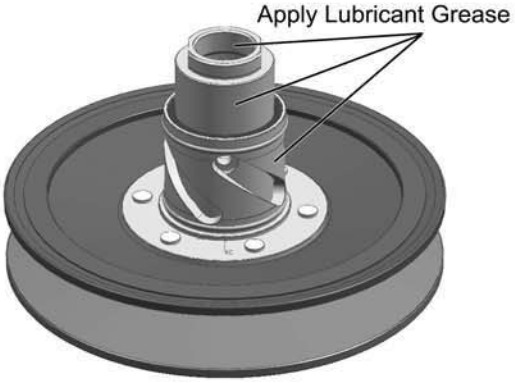
Wear or damage: → Replace



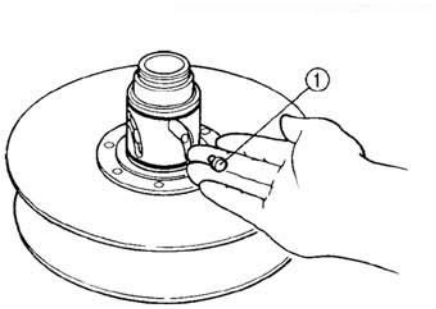
Assembly

- Install a new O-ring
- Apply lubricant grease to O-ring, oil seal lip and guide pin groove.

Material: lubricant grease

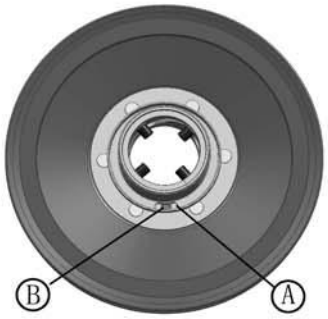


- Install guide pin and spacer ①

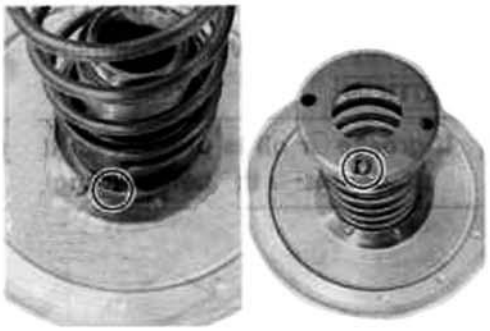


Note: To avoid damage to the oil seal lip during assembly, slide the lip with a 0.1mm steel sheet as guide.

- Install spring seat. Align hole A with hole B.



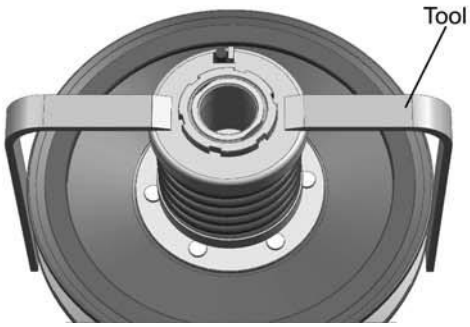
- Install spring and spring plate. Insert spring end into the hole.



- Compress spring with special tool.
- Align the secondary sheave end with spring plate hole.

Tool: Secondary sheave spring compressor

- Tighten ring nut temporarily.
- Remove the special tool from secondary sheave.



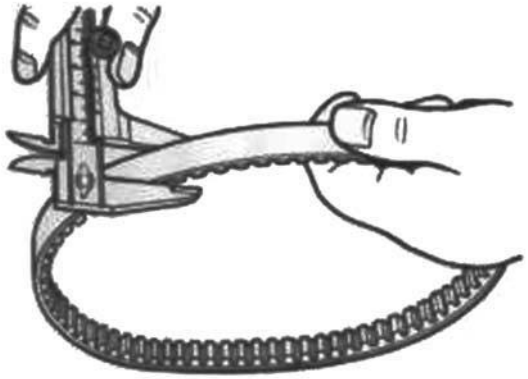
- Tighten the ring nut with special tool to the specified torque.

Ring Nut Tightening Torque: 100N·m
Tool: Ring nut wrench
Sheave Holder

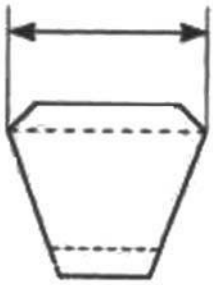
Drive belt

- Check belt for any greasy substance.
- Check contact surface of belt for any cracks and damage.
- Check belt width with vernier caliper.

Damage, width out of range: →Replace

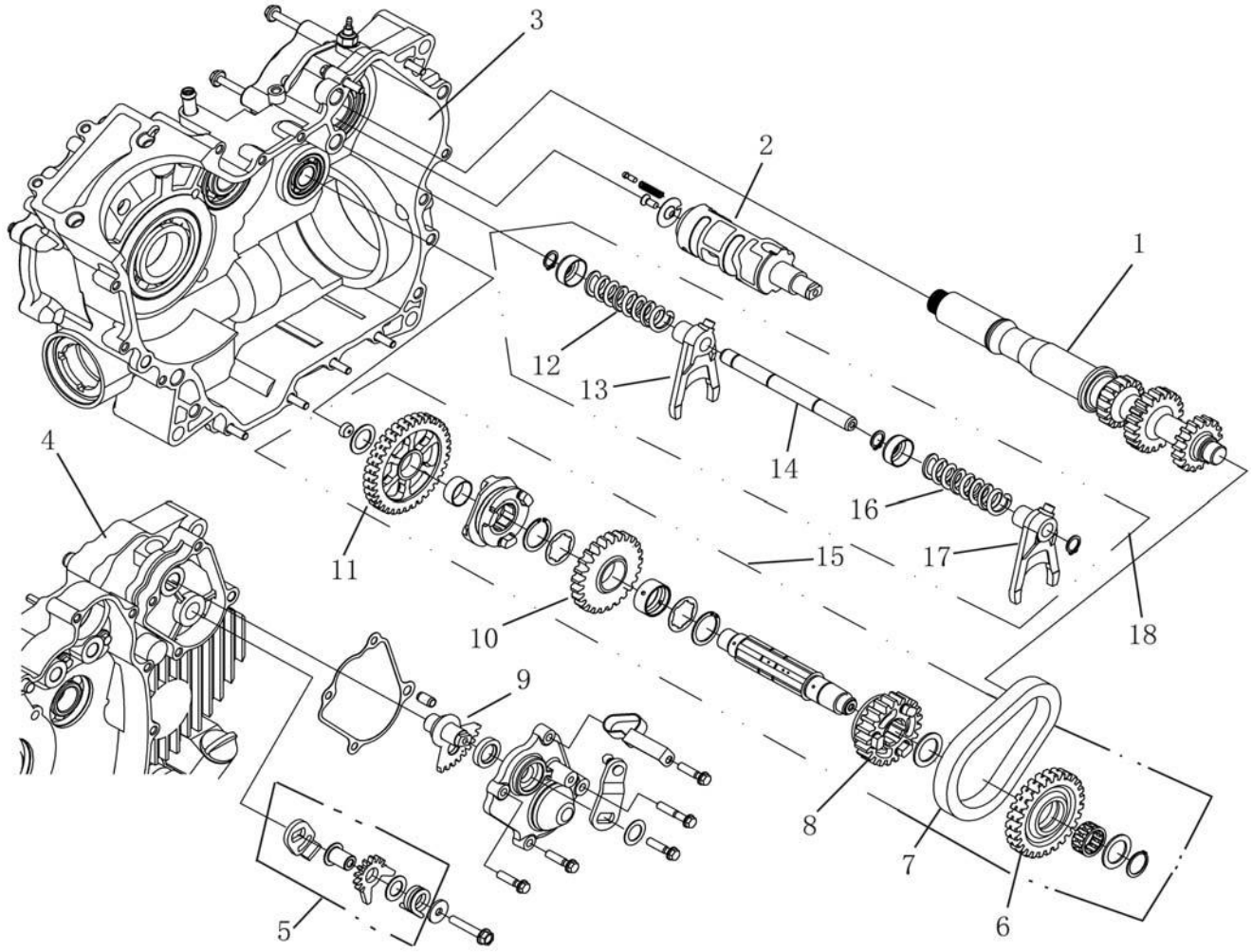


Belt width service limit: 33.5mm
Tool: vernier caliper



Caution:
If belt surface is stained with grease or oil, degrease the belt thoroughly.

Transmission

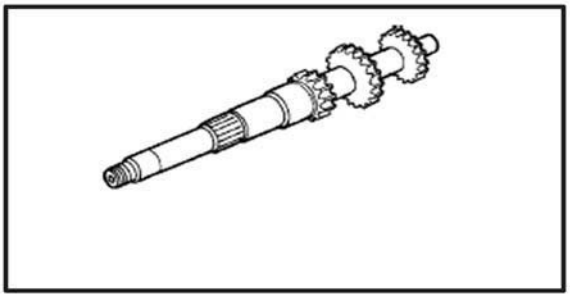


No.	Description	Qty		No.	Description	Qty
1	MAIN SHAFT. GEARSHIFT	1		10	DRIVEN GEAR, HIGH RANGE	1
2	SHIFT CAM	1		11	DRIVEN GEAR, LOW RANGE	1
3	RIGHT CRANKCASE	1		12	SPRING, SHIFT FORK	1
4	LEFT CRANKCASE	1		13	RIGHT SHIFT FORK	1
5	DRIVEN SECTOR GEAR	1		14	GUIDE BAR	1
6	SPROCKET, REVERSE GEAR	1		15	DRIVEN SHAFT	1
7	CHAIN, REVERSE GEAR	1		16	SPRING, SHIFT FORK	1
8	DRIVEN OUTPUT GEAR	1		17	LEFT SHIFT FORK	1
9	DRIVE SECTOR GEAR	1		18	SHIFT FORKASSEMBLY	1

Inspection

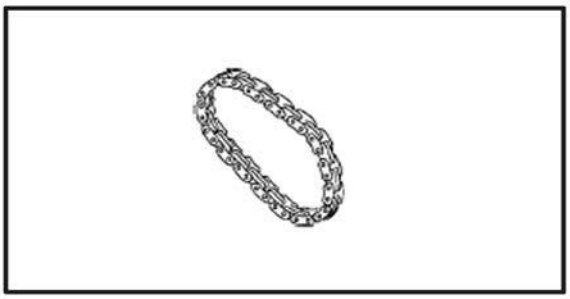
- Check main shaft gear and sprocket surface for any damage or over wear.

Damage or over wear: → Replace

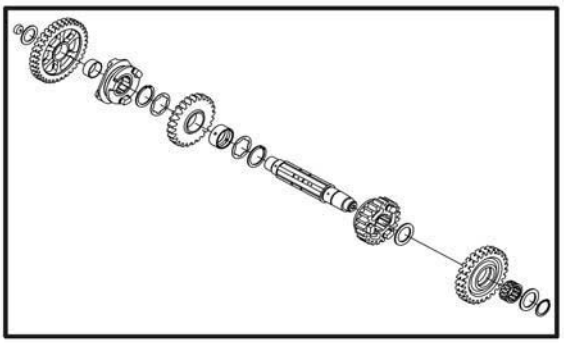


- Check reverse gear chain for any damage or over wear.

Damage or over wear: → Replace



- Disassemble driven shaft as illustrated.



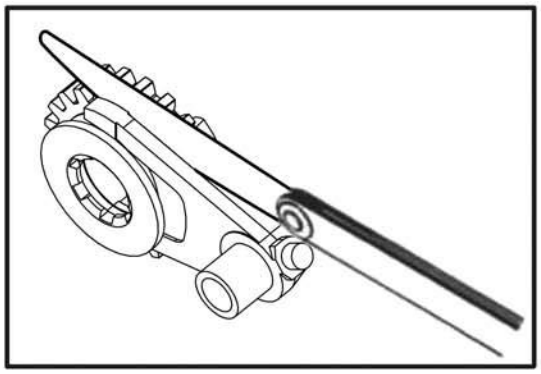
- Check each gear surface for any damage or over wear.
- Check bearing and collar for any wear or damage..

Damage or over wear: → Replace

- Check the shift fork clearance with a thickness gauge in the groove of its gear.

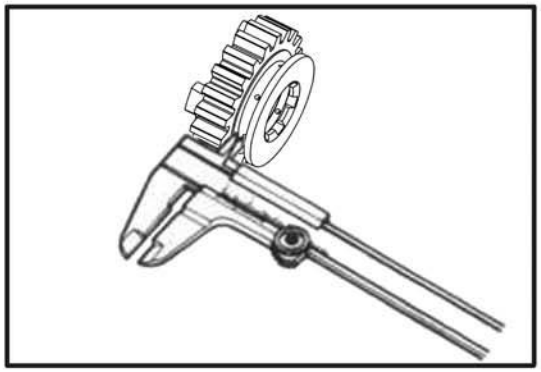
Clearance exceeds the limit: → Replace

Shift fork to Groove clearance
Standard clearance :0.10-0.30mm
Service Limit :0. 50mm



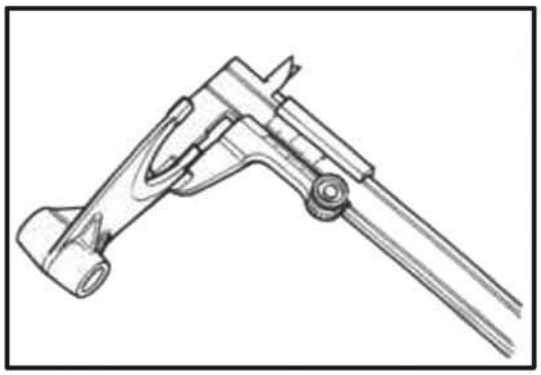
- Measure shift fork groove width with vernier caliper

Standard shift fork groove width: 6.05-6.15mm



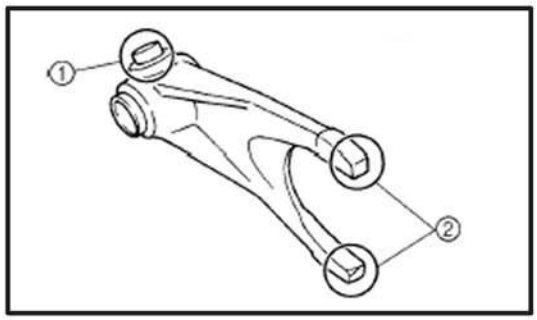
- Measure shift fork thickness with vernier calipers;

Standard fork thickness: 5.80-5.90mm

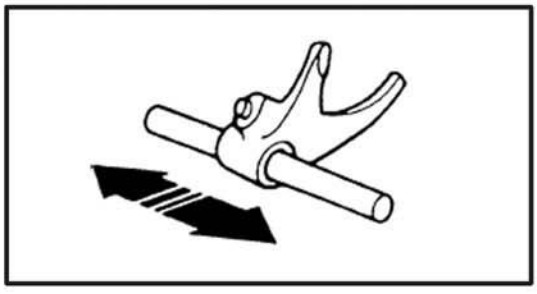


- Check shift fork①and②for damage or bend

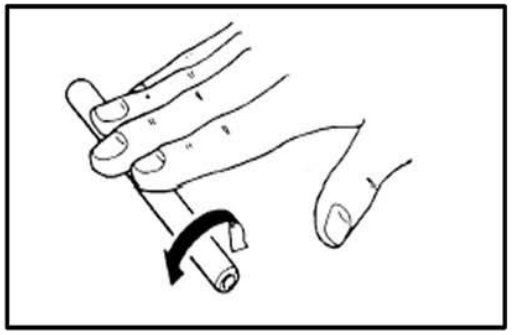
Damage, bend: → Replace



- Install shift fork to guide bar and move left and right. In case of any unsmooth moving, replace with a new one.

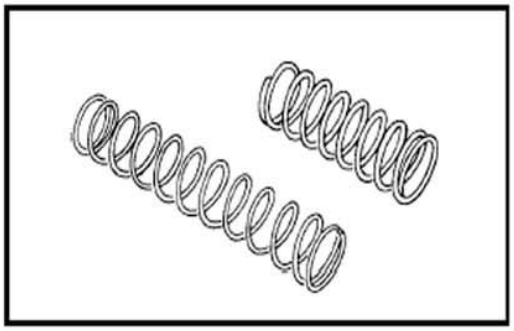


- Put the guide bar on a flat plate and roll it. In case of any bend, replace with a new one.

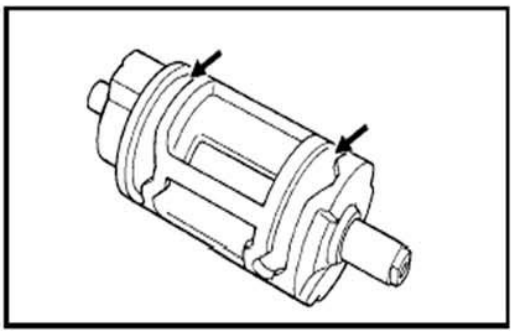


NOTE:DON NOT attempt to correct a bent guide bar.

- Check shift fork spring for breakage, damage
  Broken or damaged: → Replace



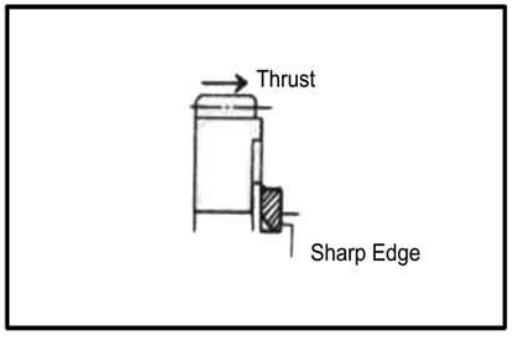
- Check shift cam groove for scratches, damage.
  Scratch or damage: → Replace



Assembly

Reverse the removal procedure for assembly. Pay attention to the following:

- Use new retainers. Pay attention to the direction of the retainers. Fit to the side where the thrust is as illustrated.

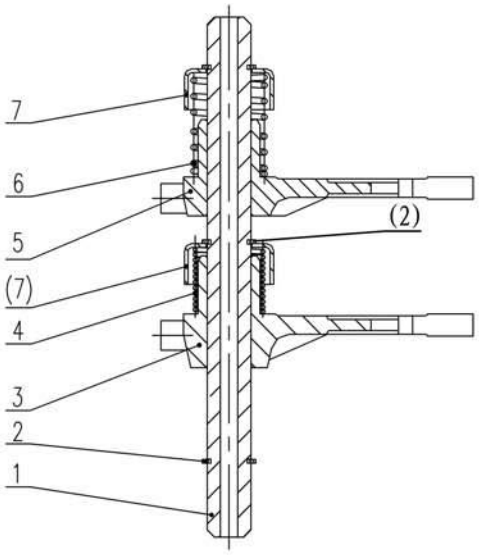


- Coat the gears and shafts with engine oil before assembly.

Note:
- Do not reuse the retainers
- Do not expand of the gap end of new retainers too wide when assembling.
- Make sure that all the retainers are properly fitted.

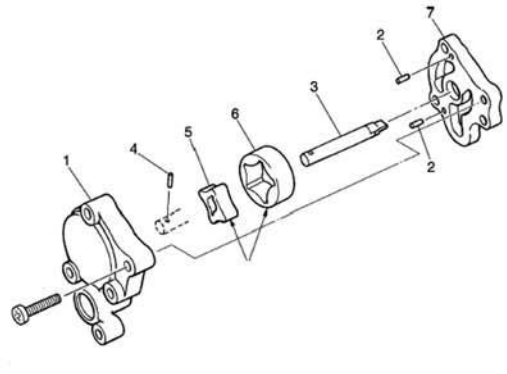
- When assembling the guide bar, take care not to assemble the two shift forks and springs in the opposite direction.

1. Guide bar
2. Retainer
3. Left shift fork
4. Shift fork Spring (small)
5. Right shift fork
6. shift fork spring (big)
7. Spring seat

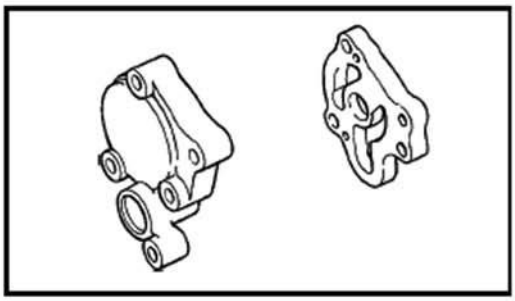


OIL PUMP

- Disassembly oil pump as illustrated:
  1. Oil pump housing
  2.Dowel pin
  3.Oil pump shaft
  4.Straight pin
  5.Inner rotor, oil pump
  6.Outer rotor, oil pump
  7. Oil pump cover

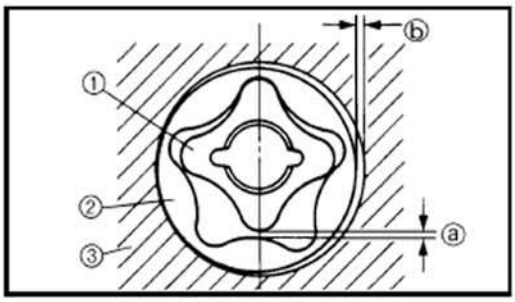


- Check oil pump housing and cover for cracks and damage.
  Crack or damage: → Replace



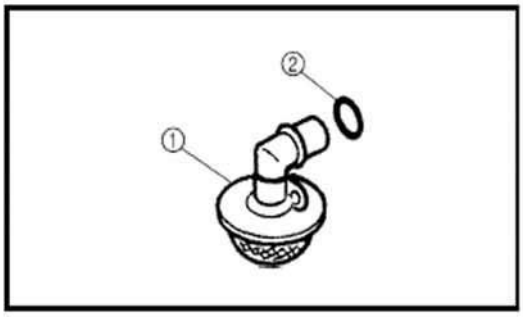
- Measure top clearance “a” between inner and outer rotors and side clearance “b” between outer rotor and oil pump housing. If the clearance exceeds the limit, replace with new one.

Top Clearance:0. 03-0.10mm
Service Limit: 0. 15mm



Side clearance: 0. 03-0.10mm
Service Limit: 0.12mm

Oil strainer

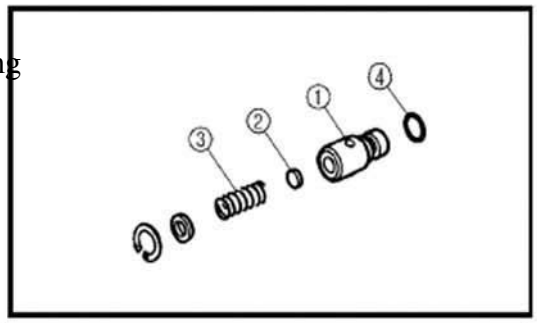


- Check oil strainer ① and O-ring ② for damage

Damaged oil strainer: → Replace

- Clean the surface of oil strainer with engine oil

Relief Valve

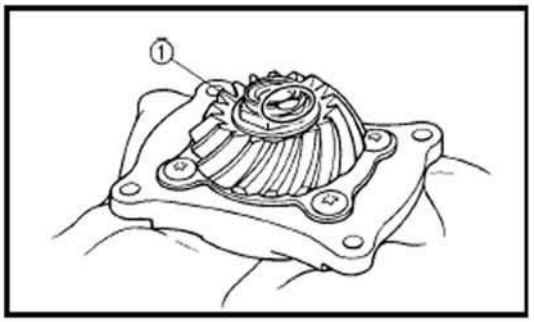


- Check the valve body ①、valve ② and spring ③O –ring ④for damage or wear.

Damage or wear: → Replace

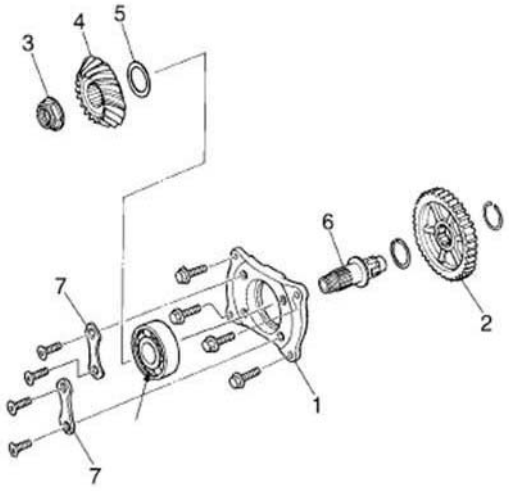
Drive Bevel Gear

- Use a clean rag to protect the drive bevel gear shaft, clamp it to the pliers.



1. Drive bevel gear cover
2. Output driven gear
3. Drive bevel gear nut
4. Drive bevel gear
5. Adjust washer
6. Drive bevel
7. Bearing press
8. Bearing

- Loosen drive bevel gear nut 3, remove the drive bevel gear 4 and adjust washer 5
- Check the drive bevel gear 4 and output driven gear 2 for rust, scratch, wear or damage. Replace if any.
- Check if the bearing 8 turns smoothly, replace with a new bearing if necessary.
- Adjust Washer 5 if any of right crankcase, drive bevel gear 4, or drive bevel gear cover 1 is replaced. Refer to bevel gear adjustment for details.
- Apply engine oil to bearing 8 when assembling and tighten nut 3 to the specified torque.



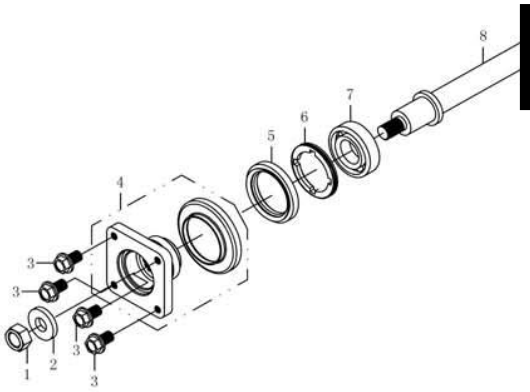
Drive bevel gear nut
Tightening torque: 145N.m

Front Output Shaft

- Check bearing 7 for smooth turning and abnormal wear. Check oil seal 5 for damage.
  Wear or damage: → Replace

- Apply lubrication oil to bearing 7 and oil seal 5 lip before assembly.

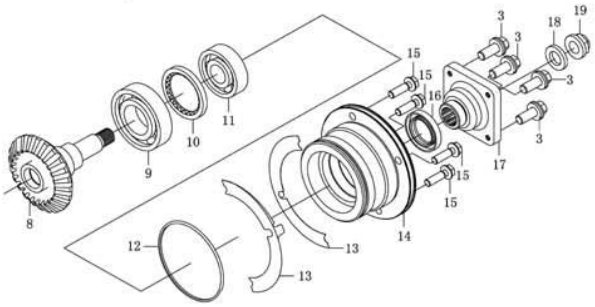
- Apply thread locker to bearing limit nut 6 (left thread) and tighten to the specified torque.
  Bearing limit nut Tightening torque: 80N.m



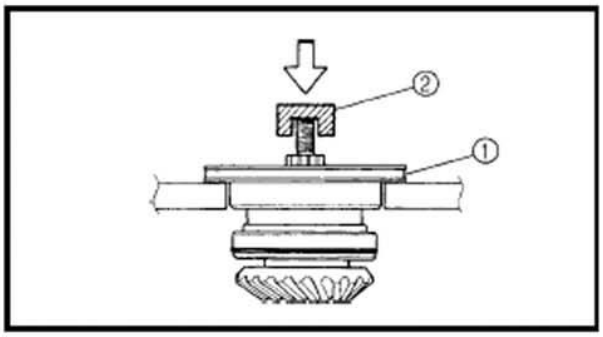
Tighten Nut 1 to the specified torque
Front output shaft nut tightening torque: 97N.m

Driven Bevel Gear

Remove nut 19, washer 18, coupler 17 and oil seal 16.

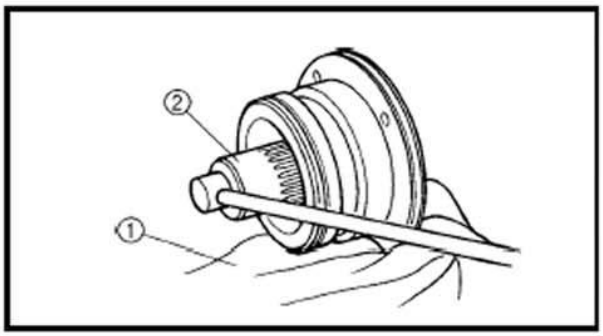


- Protect end thread of driven bevel gear with proper Device ②. Fix bevel gear cover 14 and press out driven bevel gear.
- Place a clean rag ① under bevel gear cover. Remove bearing limit nut 10 with special tool ② and remove bearing.



- Check driven bevel gear 8 surface for scratches, wear. Scratch or wear: → Replace

- Check free turning of bearing 9 and 11. Replace with a new one if any abnormal is found.

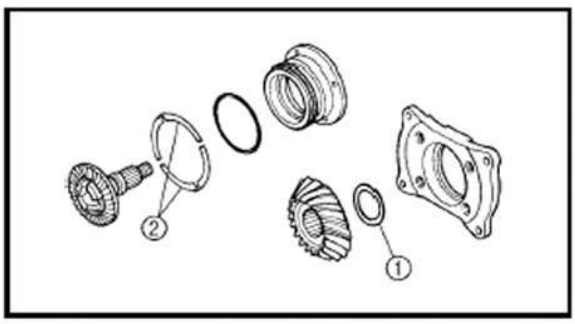


- Use new oil seal 16 and O-ring 12 when assembling.

- Adjust washer 13 if any of right crankcase, driven bevel gear 8 or driven bevel gear cover 14 is replaced. Refer to bevel gear adjustment for details.

- Apply lubrication oil to bearing 9 and 11 and oil seal 16, O-ring. Apply thread locker to nut 10 and tighten to the specified torque.

Tightening torque :110N.m
Tool: driven bevel gear nut wrench
Driven bevel gear nut tightening torque:150N.m

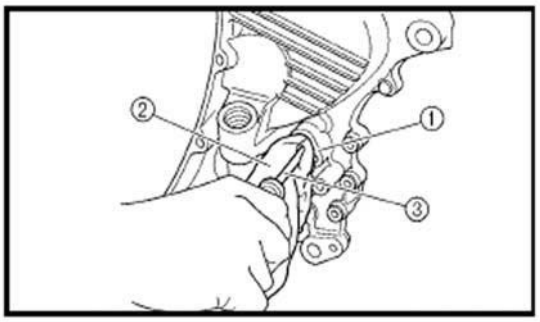


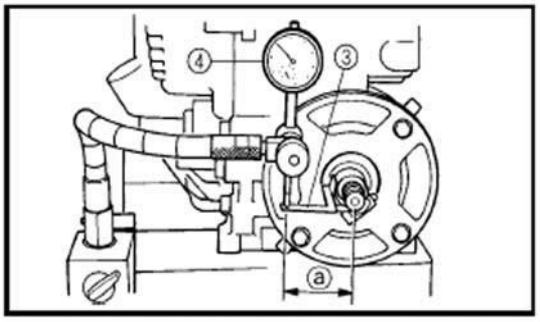
Bevel Gear Washer Adjustment

- Adjust washer ① and ② when replacing crankcase and/or bevel gear and/or bevel gear cover,

Bevel Gear

Note: Proper bevel gear engagement depends on that the gear backlash and tooth contact are within the proper range.





Bevel Gear Backlash

- Install drive and driven gears to the crankcase. Wrap a (--) screwdriver ③with a rag ② and insert it into the speed sensor hole ① of left crankcase to fix the drive bevel gear.

- Install special tool ③ and micrometer ④.

Tool: Bevel gear side clearance dial gauge
Micrometer
a=46mm

- Turn the driven bevel gear in each direction and measure the backlash.

NOTE: Measure four points in the mutual vertical direction.

- If the backlash is not within the specification, adjust the thickness of the driven bevel gear adjust washer. Re-check the backlash until the backlash is correct.

Bevel Gear Backlash: 0.1-0.2mm

Adjustment

Measured Backlash	Washer Thickness Adjustment
＜0.1mm	Decrease washer thickness
0.1~0.2m	**Correct**
＞0.2mm	Increase washer thickness

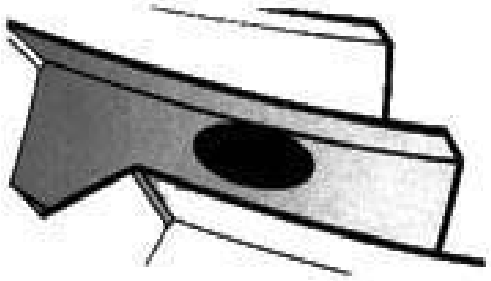
Tooth Contact

- After adjusting the backlash, check the tooth contact according to the following procedures:
- Remove drive and driven bevel gear shafts from crankcase;
- Clean and degrease every tooh of drive and driven bevel gear;
- Coat the driven bevel gear with machinist's layout dye or paste;
- Install drive and driven bevel gear;
- Rotate the driven bevel gear several turns in both directions;
- Remove drive and driven bevel gear shafts and check the coated teeth of the drive bevel gear;
- Refer to the illustration on the right for tooth contact pattern ①, ② and ③

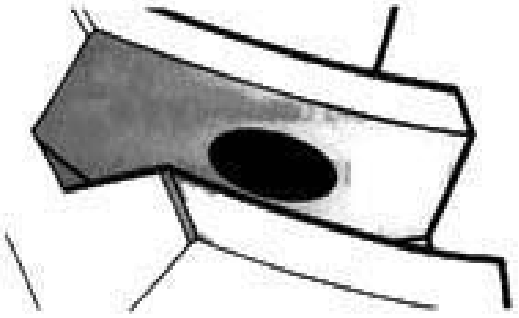
① Incorrect (contact at tooth top)
② Correct
③ Incorrect (contact at tooth bottom)

- If tooth contact is correct (Contact ②), continue the next procedure.
- If tooth contact is not correct (② and ③), adjust the thickness of the washer of drive bevel gear. Repeat above steps to check tooth contact until it is correct.

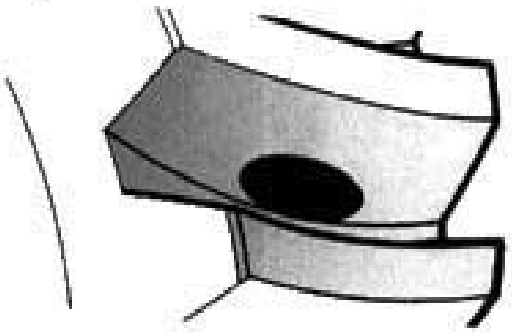
①



②



③



Adjustment

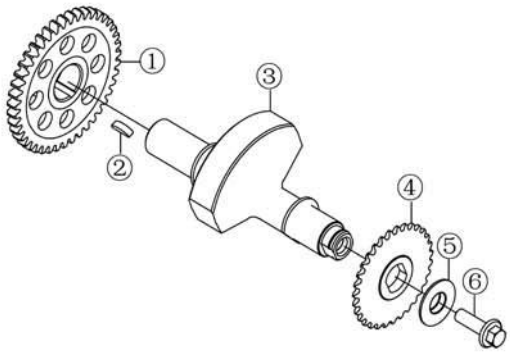
Tooth Contact	Washer Adjustment
Contact at tooth top ①	Increase Thickness
Contact at tooth bottom ③	Decrease Thickness

Note:

- After adjusting the tooth contact, the backlash must be checked again;
- If the backlash is adjusted but tooth contact is still out of specification, replace the drive and driven bevel gears;
- Both tooth contact and backlash should be within the required specification.

Balancer Shaft

- Remove the parts as illustrated on the right. Check each part for abnormal wear or damage.
  Wear or damage: → Replace



① Balancer shaft gear
② Woodruff key
③ Balancer shaft
④ Balancer shaft sprocket
⑤ Washer
⑥ Bolt

Magneto Rotor

- Remove starter clutch nut;

- Check starter clutch roller and holder for abnormal wear or damage.
  Wear or damage: → Replace
- Install the starter clutch in the correct direction.

Note:
When install the starter clutch to the magneto rotor, make sure side "A" is in the right direction.

- Face arrow mark "B" to the engine side;
- Apply engine oil to starter clutch.

- Apply thread locker to bolt and tighten to the specified torque:

Tightening torque of starter clutch bolt: 26N.m
Material: Thread Locker

- Install the starter driven gear
- Make that the starter driven gear turns in the opposite direction of the arrow mark "B". The gear cannot turn in the direction of the arrow.

- Check starter driven gear bearing. In case of anything unusual, replace the bearing.

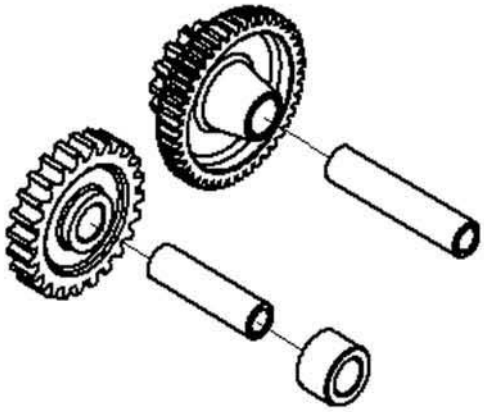
- Remove starter driven gear bearing with special tool
- Install starter driven gear bearing with special tool.

Tool: Bearing Installer/Remover

Electric Starter Gear

- Check the gear surface for scrap or damage.

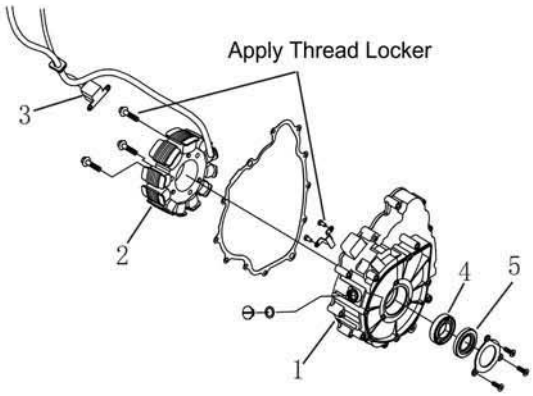
Scrape or Damage: → Replace



LEFT CRANKCASE COVER

- Check magneto stator coil 2, pickup coil 3 for damage,
- burn or short circuit, if any , replace with new one;
- Check bearing 4 for smooth turning. If it is stuck, replace with a new one;
- Check oil seal 5 for damage. Replace it if it's damaged;
- Apply thread locker to the bolt when assembling.

Tightening torque for magneto coil bolt: 10N.m

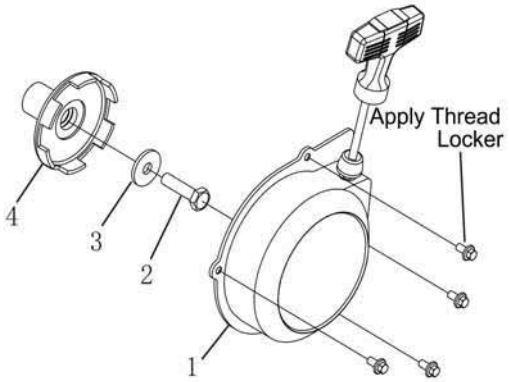


- Apply lubrication oil to bearing 4 and lubricant grease to lip of oil seal 5 when assembling.

Recoil Starter

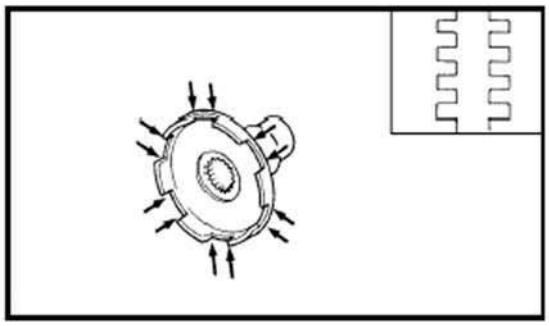
Disassembly

1— Recoil starter
2— Bolt
3— Washer
4— Starter pully



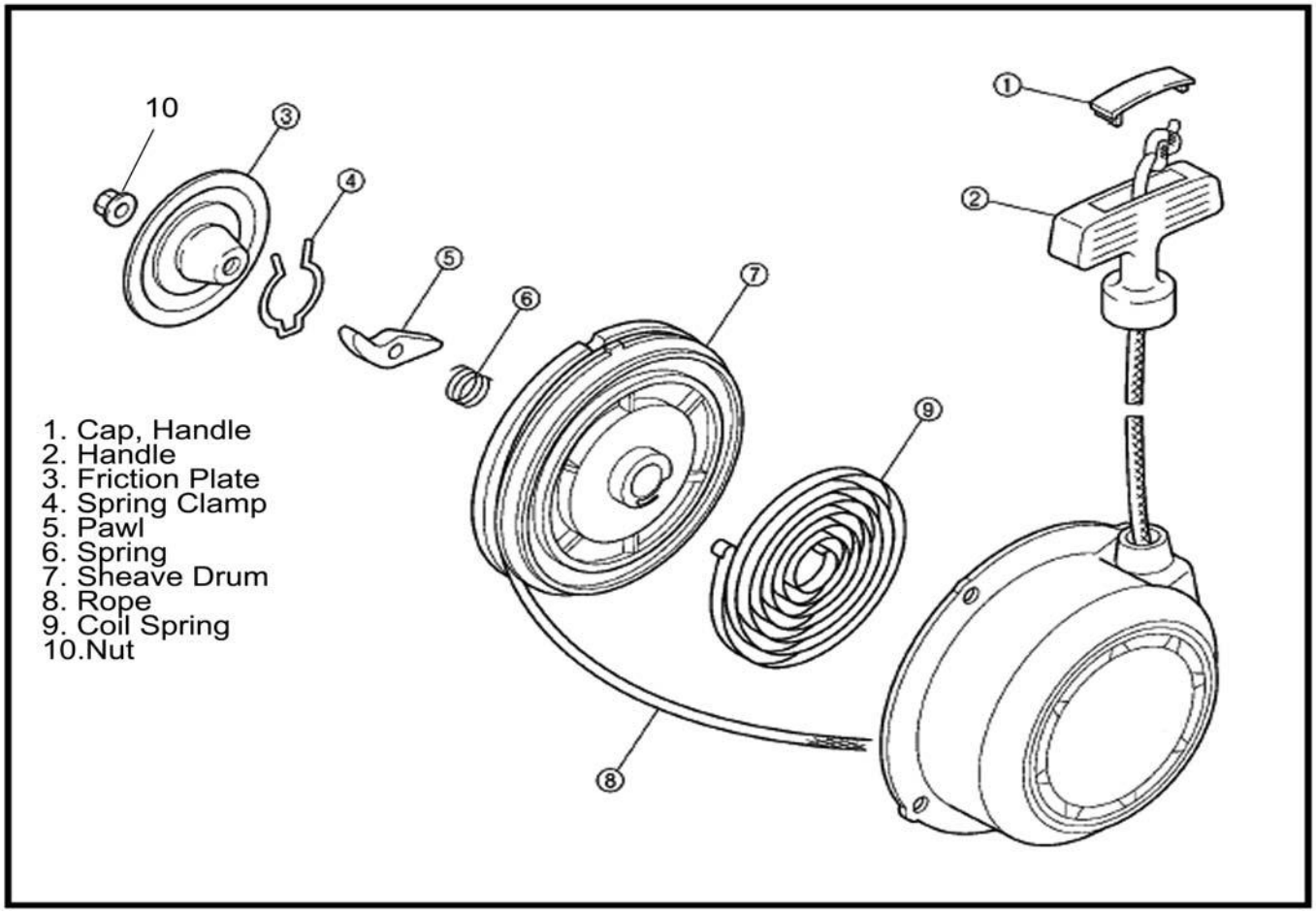
Inspection

Check sheave drum for burrs, cracks or rust. In case of any abnormal, replace.



Recoil Starter

- If the recoil starter works normally, it's not necessary to disassemble it.



DISASSEMBLY

- Remove nut 10,
- Remove the parts from the starter housing.

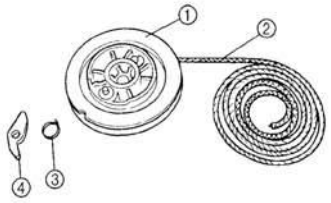
WARNING !
The coil spring may quickly unwind and cause injury when the sheave drum is opened. Wear proper hand and eye protection beforehand.

Inspection

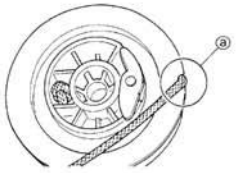
Check all the parts for damage.
Damage: →Replace

Assembly

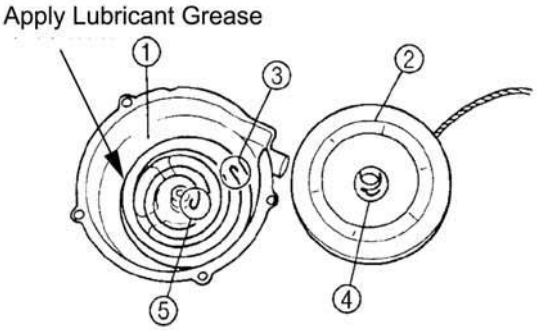
- Reverse the removal procedure for installation and pay attention to the following:



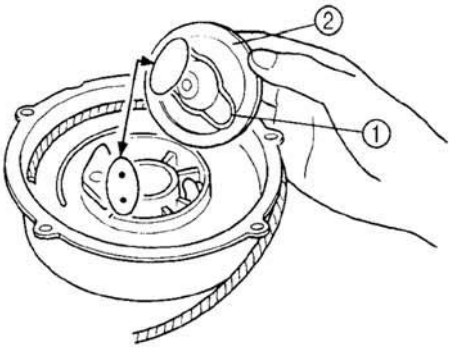
- Install sheave drum①, rope②, coil spring③, damper④
- Wind the rope clockwise around the sheave drum three times and hook the rope at “a” of sheave drum.



WARNING !:
The coil spring may quickly unwind and cause injury when the sheave drum is opened. Wear proper hand and eye protection beforehand.

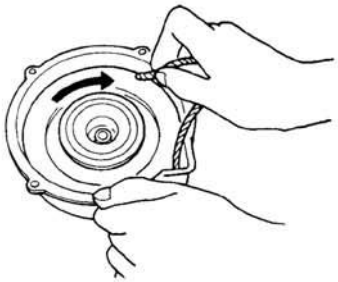


- Install coil spring ①and sheave drum ②
- Apply lubricant grease to spring
- Hook coil spring end ③ to the starter housing, wind the coil spring clockwise.
- Hook the other end ⑤of coil spring to hook part ④ of sheave drum.



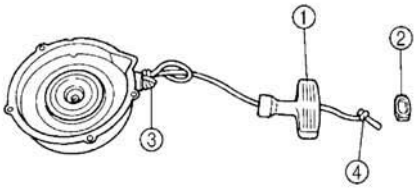
- Install spring clamp①, friction plate ② and bolt.
- Turn sheave drum three times for pretension of coil spring.

- Install handle① and handle cap②



- Tie a knot④ on handle and release knot ③

- Lead the rope through the hole of the starter housing and tie a knot ③so that the rope would not be drawn back.

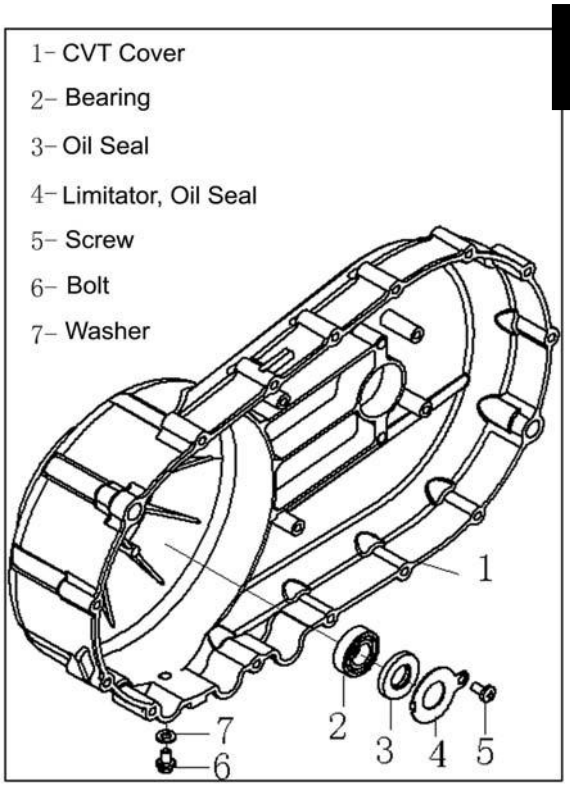


CVT Cover

- Remove screw 5, oil seal limitator 4. Remove oil seal 3 with special tool;
- Check bearing 2 for free turning. In case of any abnormal, remove with special tool and replace with a new bearing;
- Apply lubrication oil to outer ring of bearing and install bearing with special tool. Check bearing for smooth turning.
- Apply grease to bearing inner side;
- Apply grease to oil seal lip and install oil seal with special tool.

Note: Use a new oil seal.

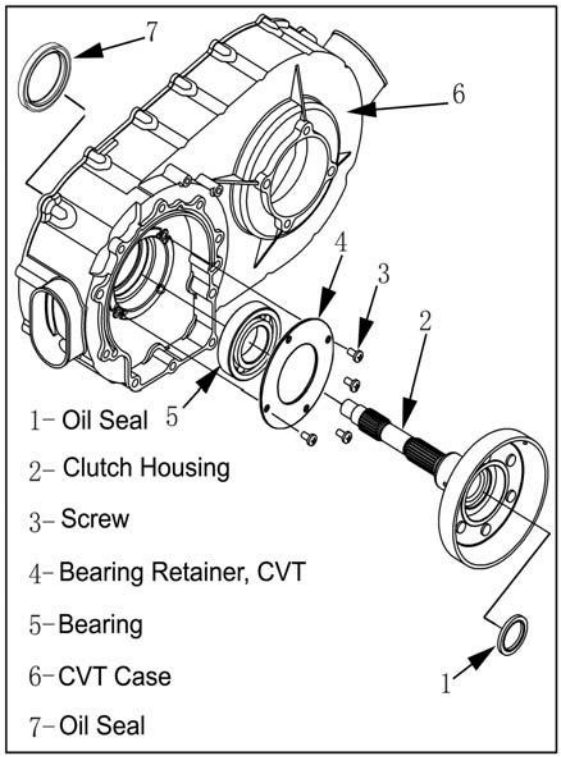
- Install oil seal limitator and tighten screw after applying thread locker.



Tool: Bearing Remover
Oil Seal Remover
Bearing Installer

CVT Case

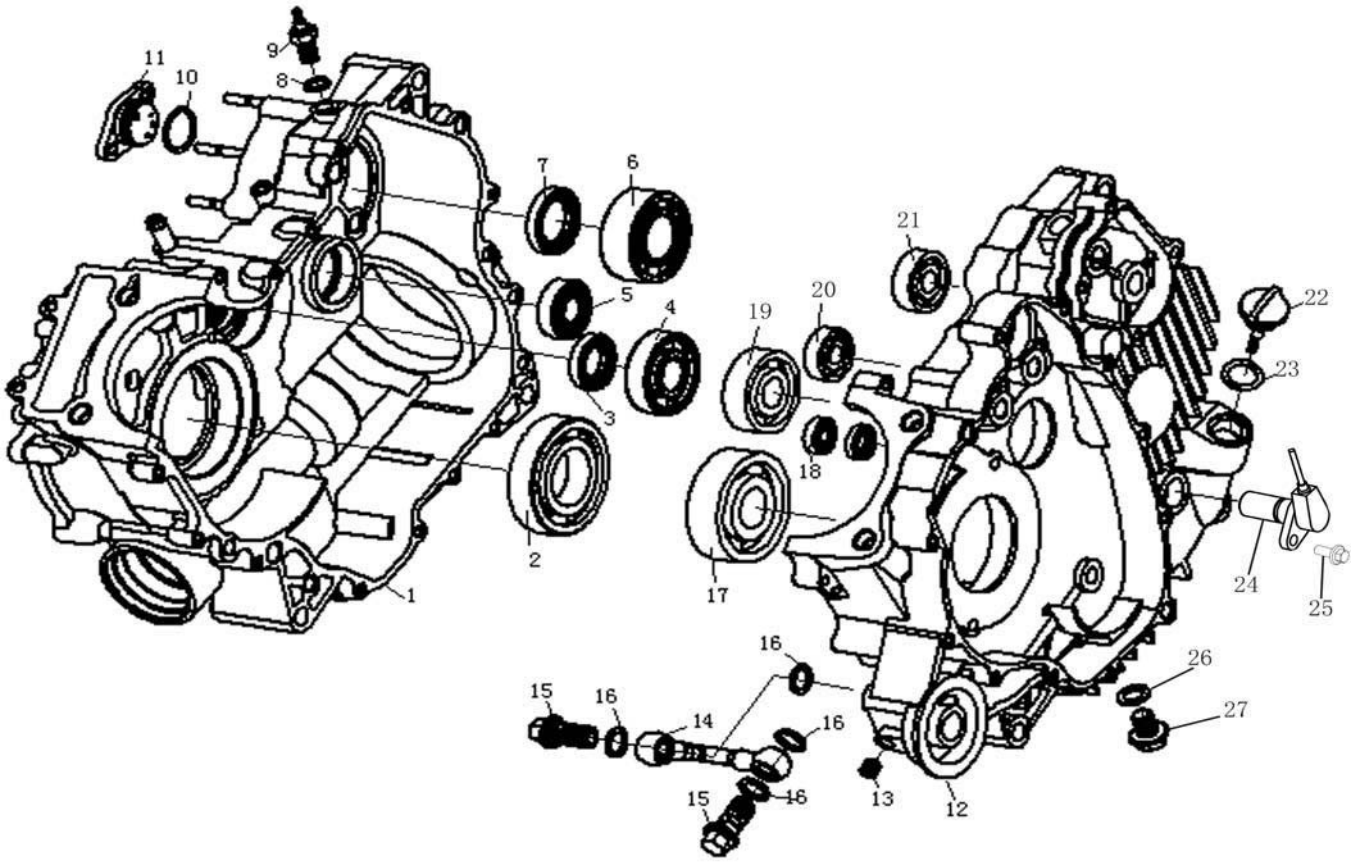
- Check bearing 5 for smooth turning. In case of any abnormal, remove screw 3 and bearing retainer 4 and replace with a new bearing.
- Check oil seal 7. In case of any damage, replace it;
- Apply grease to oil seal lip and install with special tool.
- Apply lubrication oil to bearing 5 and install with special tool; Check bearing for smooth turning. The seal side of bearing 5 should face bearing retainer 4.



- Install bearing retainer 4 and screw 3.
- Install oil seal 1 into clutch housing 2 with special tool.

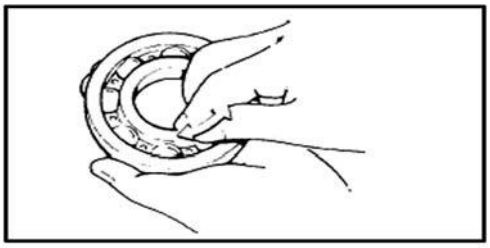
Tool: Oil Seal Installer
Bearing Installer

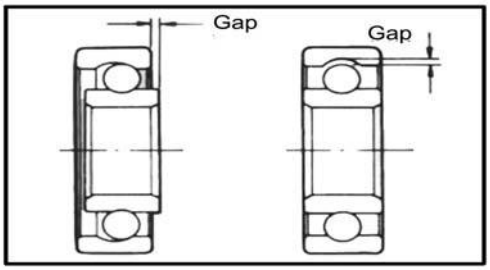
Crankcase



1. Right Crankcase
2. Bearing
3. Oil Seal
4. Bearing
5. Bearing
6. Bearing
7. Oil Seal
8. Washer, Reverse Gear Sensor
9. Reverse Gear Sensor
10. O-ring
11. Gear Sensor
12. Left Crankcase
13. Screw
14. Oil Pipe
15. Link Bolt
16. Washer
17. Bearing
18. Bearing
19. Bearing
20. Bearing
21. Bearing
22. Oil Dip Rod
23. O-ring
24. Speed sensor
25. Bolt
26. Washer
27. Oil Drainage Bolt

- Clean and grease the bearings, turn the inner race of bearing and check the play, noise and smooth turning. In case of any abnormal, remove bearing with special tool and replace;
- Check all the oil seals for over wear or damage. In case of any over wear or damage, remove with special tool and replace with a new oil seal;
- Remove gear sensor 11 and check for continuity with reverse gear sensor 9 with a multimeter.
- Remove link bolt and oil pipe 14 and check oil pipe for crack or clog. Replace with a new one if any;
- Remove oil drainage bolt 27 and clean it.





Note: Check bearing for smooth turning after installation.

- Install new O-ring and apply grease;
- Install gear sensor;
- Install reverse gear sensor 9 and tighten to the specified torque.

- Reverse gear sensor tightening torque: 20N.m

- Install speed sensor 24

- Install oil pipe and tighten the link bolt to the specified torque;
  Link bolt tightening torque: 18M.m

- Install washer 26 and oil drainage bolt 27 and tighten to the specified torque;
  Drain bolt tightening torque: 30N.m

Tool: Bearing Remover
Bearing Installer
Multimeter

III Engine Assembly

Reverse the engine removal procedure for installation.

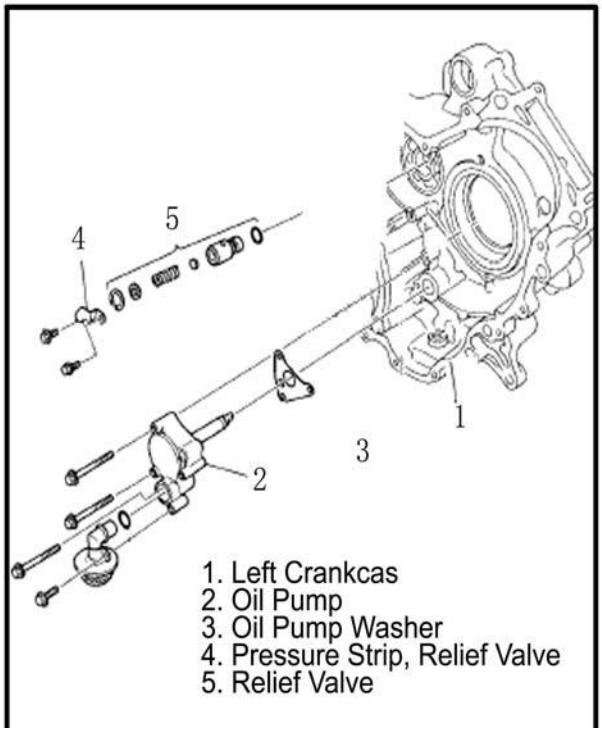
Caution:
- Clean all the parts before assembly;
- Make sure that the parts are in good condition without any damage;
- Apply engine oil to the moving parts before assembly;
- Apply grease to oil seal lip and O-ring

Caution:
Make sure that drive belt, primary and secondary sheaves are not stained with grease.

Engine Center
Oil Pump and Relief Valve

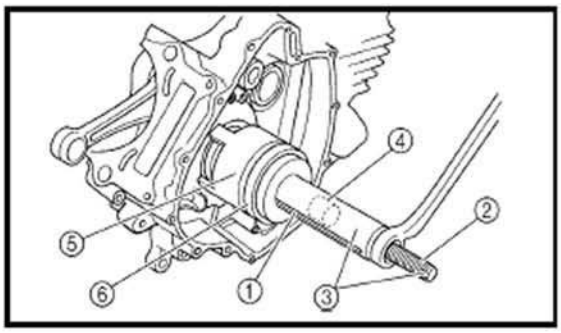
- Install oil pump and relief valve to left crankcase, as illustrated on the right. Tighten to the specified torque:

Oil pump bolt: 10N.m
Relief valve bolt: 10N.m



Connecting Rod

- Install connecting rod to left crankcase with special tool;



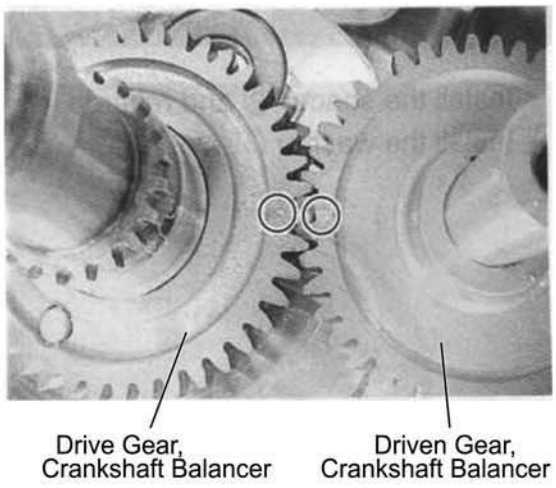
Note:
- Do not hammer the conrod into crankcase with plastic mallet;
- Use special tool to avoid affect of conrod precision

Tool: Conrod Installer

Balancer Shaft

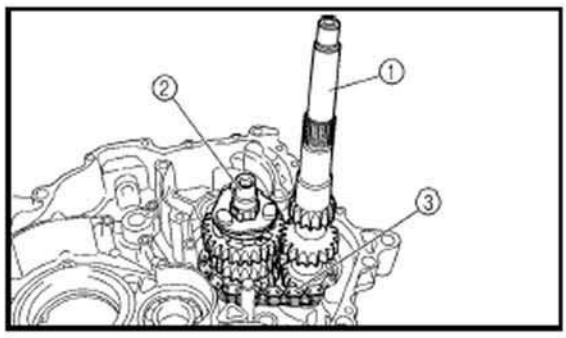
- Install balancer shaft

Caution: Balancer shaft driven gear should be aligned to the mark as illustrated.



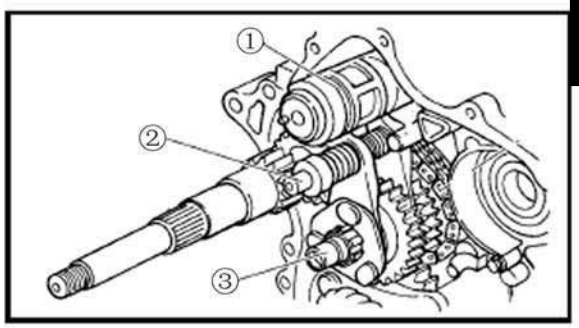
Main Shaft, Counter Shaft

- Install main shaft and counter shaft.

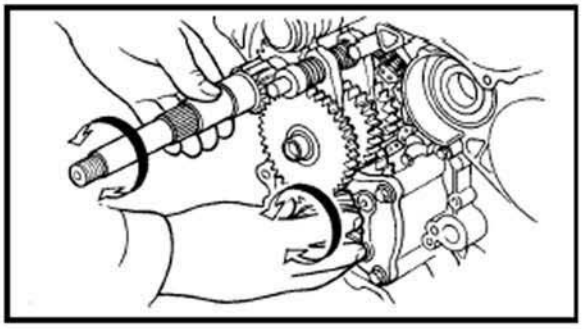


Shift Cam, Shift For

- Install shift can① and shift fork②



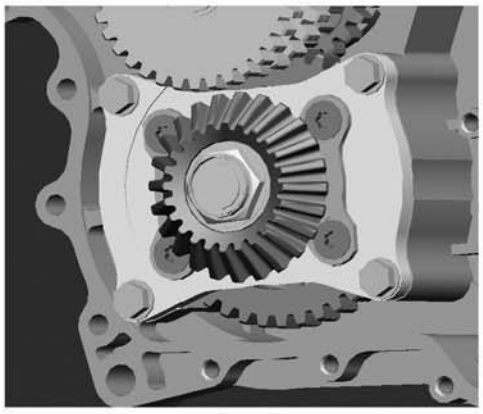
- Check each part for smooth turning
- Install low range driven gear to counter shaft③
- Spray adequate engine oil to each part.



Drive Bevel Gear

- Install drive bevel gear and tighten to the specified torque.

  Drive bevel gear tightening torque: 32N. m



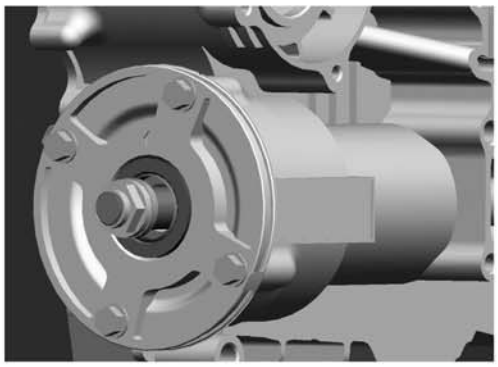
Right Crankcase

Driven Bevel Gear

- Install driven bevel gear and tighten to the specified torque.

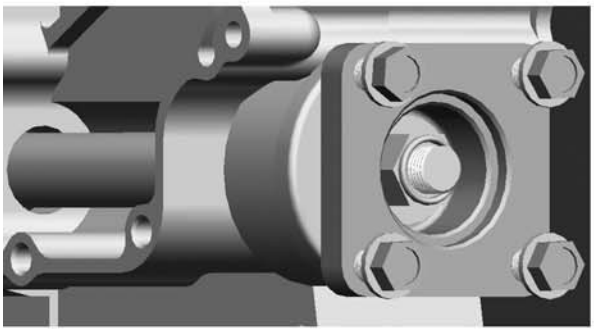
  Driven bevel gear tightening torque: 25N. m

- Check bevel gear backlash (Refer to 12-44)

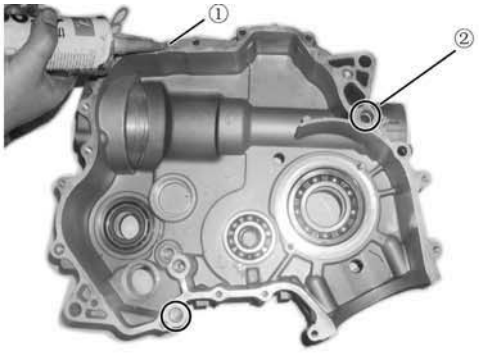


Front Output Shaft

- Install front output shaft to right crankcase



- Apply sealant ①to the mating face of right crankcase.



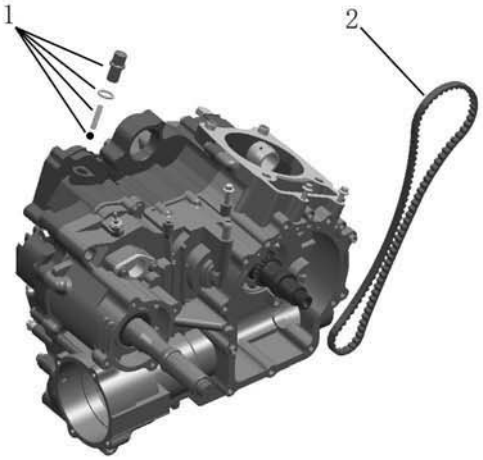
Note: Apply sealant evenly in an uninterrupted thin line.

- Install 2 dowel pins②
- Assemble crankcase and tap slightly with a rubber hammer so that the crankcase is properly fitted.
- Install bolt and tighten to the specified torque.

Crankcase bolt tightening torque: M6: 10N.m

M8: 25N.M

Note: Crankcase bolts should be tightened diagonally in several steps.



- Place the steel ball and install gear positioning bolt and tighten the bolt to the specified torque.

Gear positioning bolt tightening torque: 18M.m

Engine Right

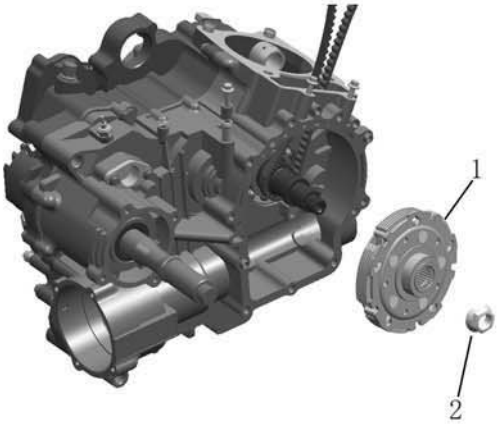
Timing Chain

- Put on timing chain 2

Clutch

- Install clutch 1 and nut 2. Tighten the nut to the specified torque (left thread).

Clutch nut tightening torque: 70N.m

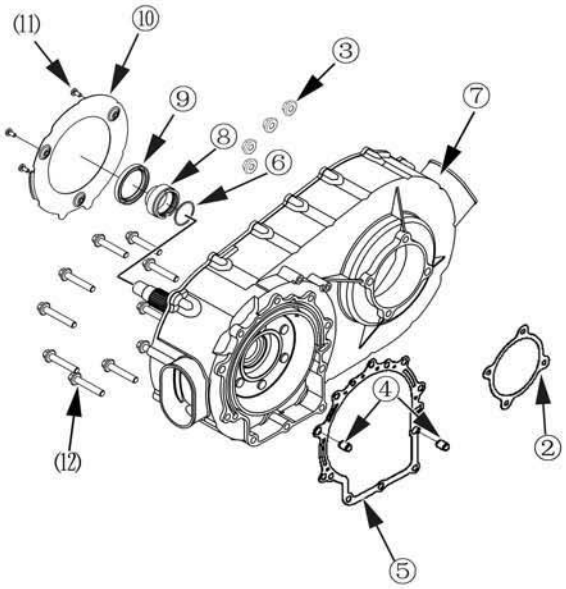


- Install new o-ring in spacer⑧
- Install spacer onto the clutch housing shaft, then install into CVT case

Note: align oil nick on spacer with oil hole on the shaft.

CVT Case

- Install dowel pin ④, gasket ② and gasket ⑤ to the right crankcase. Install CVT case assembly to right crankcase.
- Install bolt ⑿ and nut③

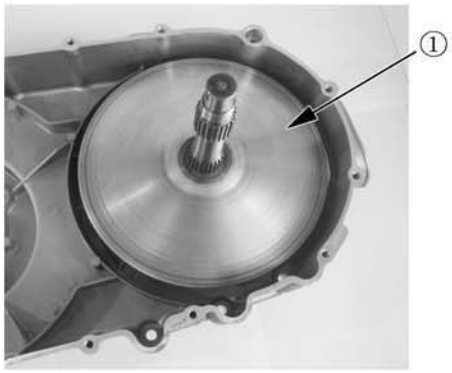


Note:
- Tighten bolt/nut diagonally.
- Use a new gasket.

- Install air guide plate and screw⑾

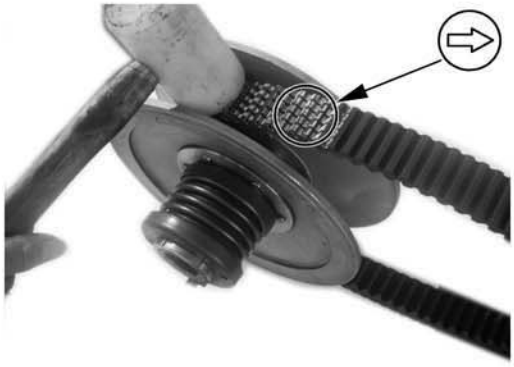
Primary Sheave, Secondary Sheave, Drive Belt

- Install primary fixed sheave ① as illustrated on the right;



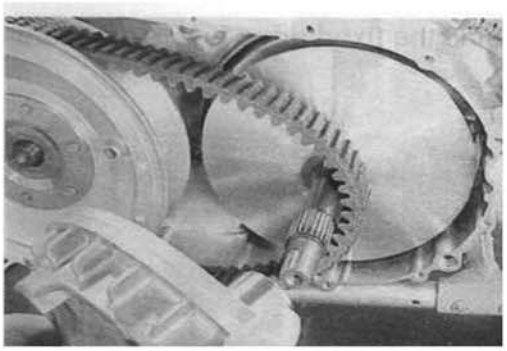
- Install drive belt between secondary sliding/fixed sheave and tap with a plastic hammer to keep the belt as low as possible.

Note:
- Install the drive belt with the arrow on the belt turn in the clockwise direction
- Drive belt contact surface should be free from any stains.



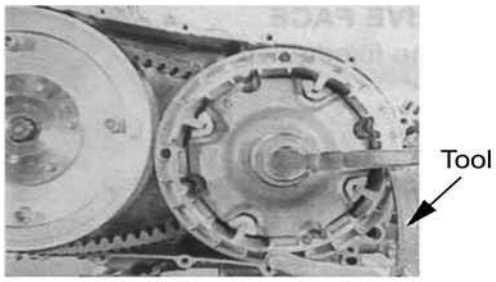
- Install secondary sheave;

- Install primary sliding sheave



- Tighten primary sheave nut with special tool to the specified torque;

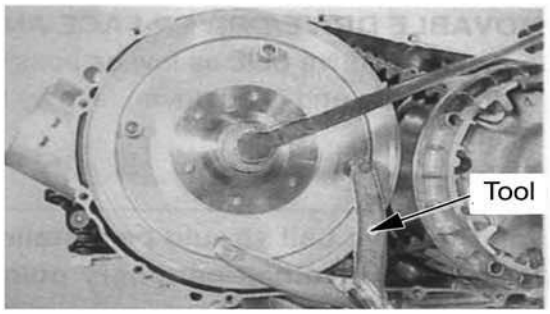
Primary sheave nut tightening torque: 115 N·m
Tool: Rotor Holder



- Tighten secondary sheave nut with special tool to the specified torque;

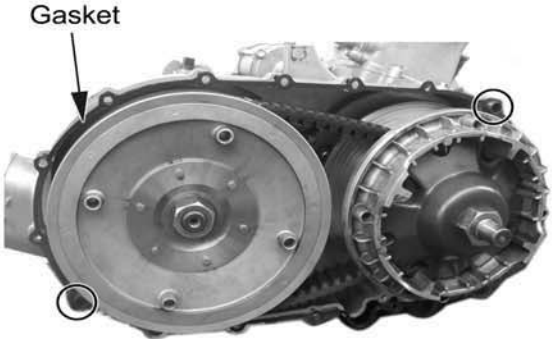
Secondary sheave tightening torque: 115 N·m
Tool: Rotor Holder

Note:
Turn the primary fixed sheave until the belt is seated in and both primary and secondary sheaves move together smoothly without slip.



CVT Case Cover

- Install the new gasket and dowel pins.



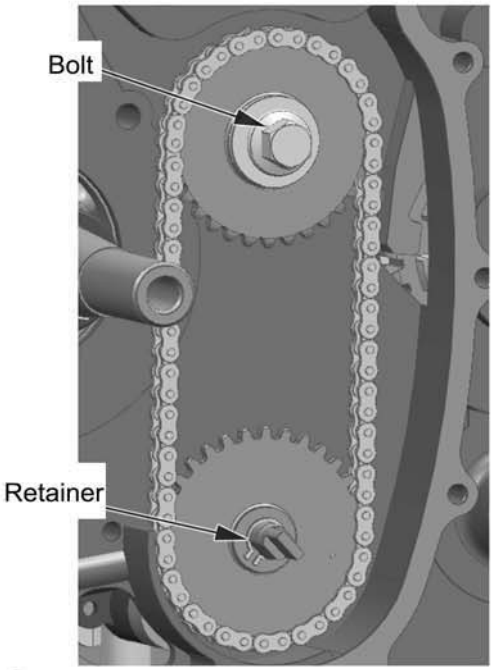
- Install CVT case cover bolts and tighten diagonally in several steps.

Engine Left

Oil Pump Sprocket and Chain

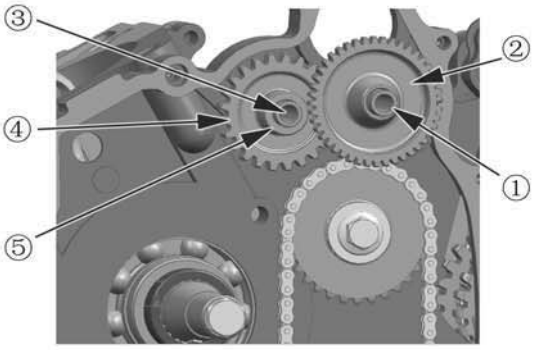
- Install oil pump drive sprocket;
- Install oil pump driven sprocket;
- Install oil pump drive chain;
- Install oil pump sprocket bolt;
- Install sprocket retainer with a long nose pliers

Tool: Long Nose Pliers



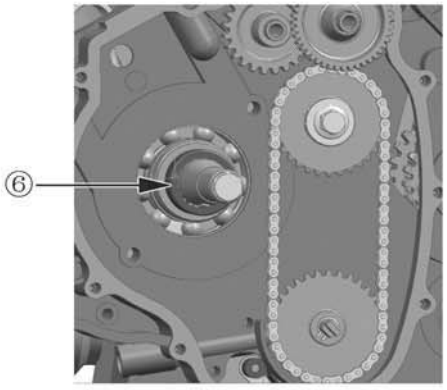
Dual Gear, Idle Gear

- Install dual gear shaft and① dual gear ②
- Install dual gear③, dual gear ④and bush⑤

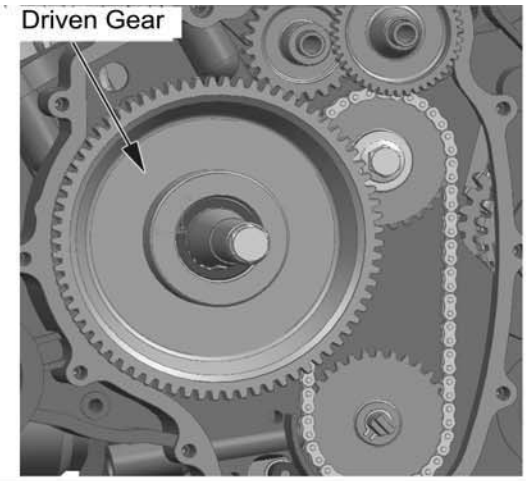


Starting Driven Gear

- Install starting driven gear ⑥



- Install starting driven gear;



Magneto Rotor

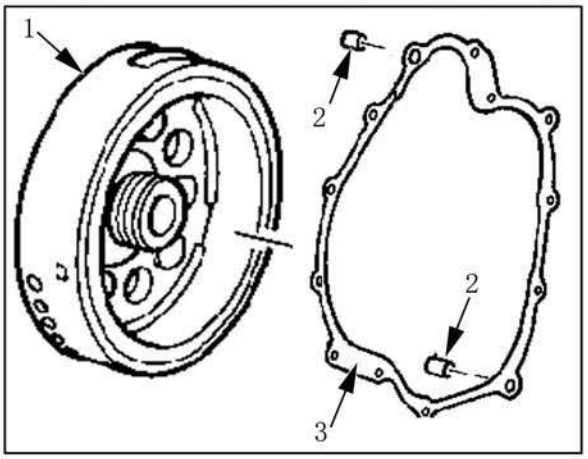
- Install woodruff key into crankshaft groove;
- Install magneto rotor 1;

Note: Degrease the tapered part of rotor and crankshaft. Use nonflammable solvent to clean off the oily or greasy matter and fully dry the surfaces.

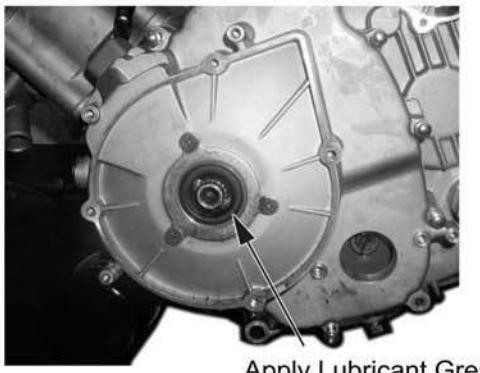
Left Crankcase Cover

- Install dowel pin2 and gasket 3

Note: Use a new gasket.



- Apply Lubricant grease to oil sea lip;
- Install left crankcase cover;
- Install bolts;



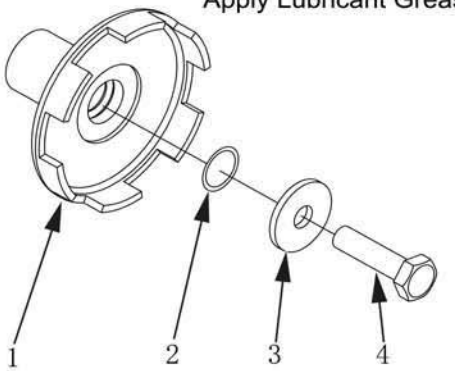
Recoil Starter

- Install recoil starter 1
- Install O-ring 2

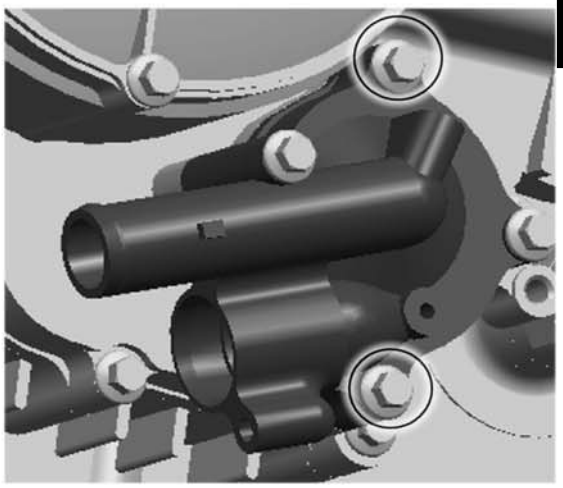
Note: Use a new O-ring and apply lubricant grease to the O-ring

- Install washer 3 and bolt 4, tighten to the specified torque:

Recoil starter bolt tightening torque: 55N.m.



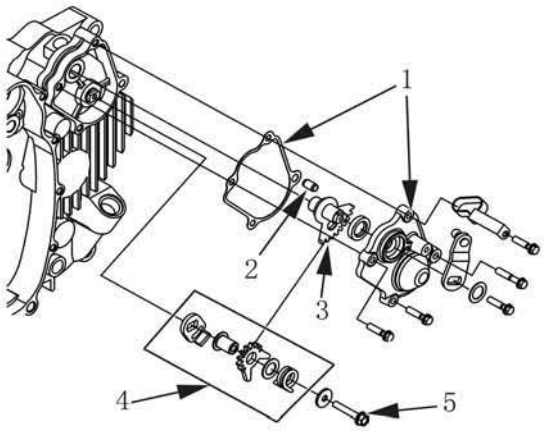
Water Pump



- Install water pump;
- Install water pump fixing bolts;

Note: Before tightening the bolts, be sure to insert oil pump shaft into groove of water pump shaft.

Sector Gear

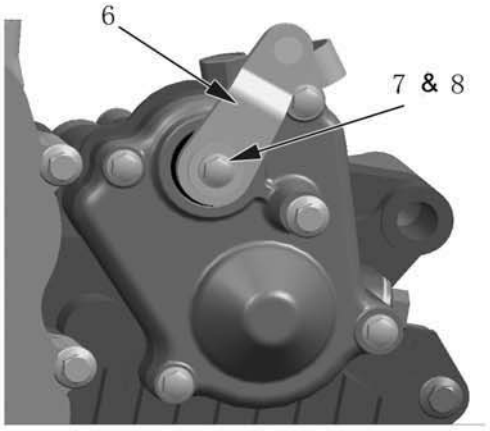


- Install the parts as illustrated on the right.

1- sector gear cover and gasket
2-dowel pin
3-drive sector gear
4-driven sector gear
5-driven sector gear bolt

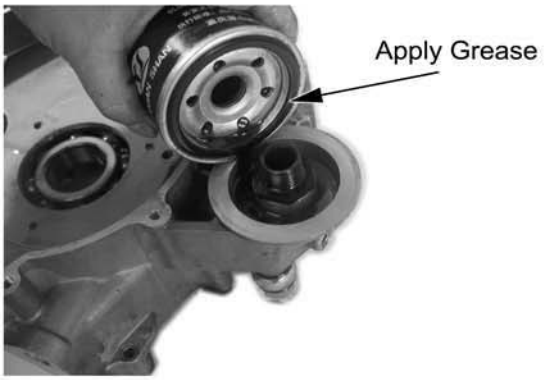
Note: When the shift cam is in the neutral position, the mark of drive sector gear should be between the two. marks of the driven sector gear.

Driven sector gear tightening torque: 14N.m



- Install gearshift rocker arm
- Install rocker arm bolt 7and washer 8.

Oil Filter



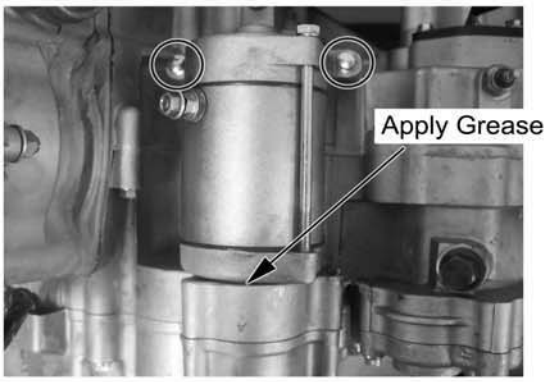
- Install oil filter bolt and tighten to the specified torque;

Oil filter bolt tightening torque: 63 N·m

- Apply engine oil to O-ring;

- Install oil filter, turn it by hand until the filter gasket contacts the mating surface. Tighten the bolts to the specified torque.

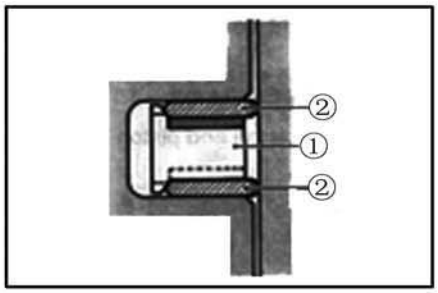
Tool: Oil Filter Wrench



Starting Motor

- Apply engine oil to new O-ring;
- Install starting motor;
- Install bolt and tighten to the specified torque

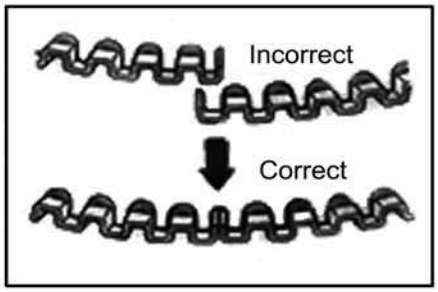
Tightening torque: 10N·m



Engine Top Side

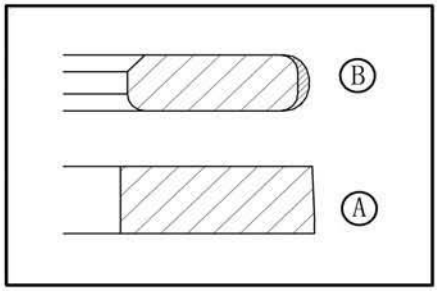
Piston

- Install the piston rings in the order of oil ring, ②ring and ①ring.;
- The first member to go into the oil ring groove is spacer , after placing the spacer, fit the two side rails .②



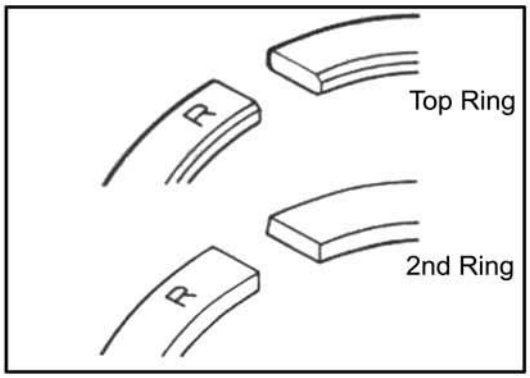
Warning: when installing the spacer ①， do not overlap its two ends in the groove.

Install the second ring A and first ring B

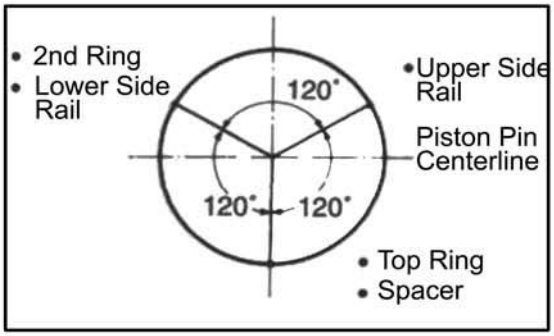


Note: 1st ring and 2nd ring differ in shape.

- 1st and 2nd rings have letter “R” marked on the side. Be sure to bring the marked side to the top when fitting them to the piston.



- Position the gaps of the three rings as illustrated on the right. Before installing the piston into the cylinder, check that the gaps are so located.

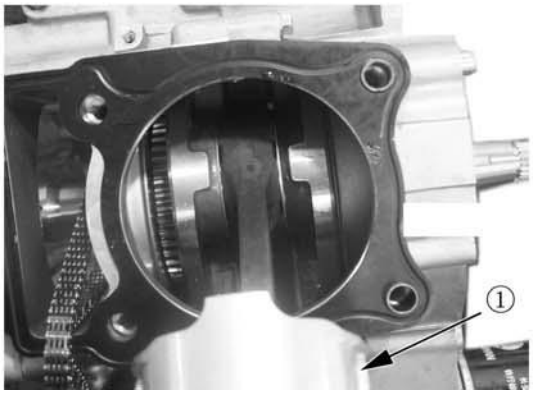


- Apply a light coat of moly oil to the piston pin;
- Install piston pin into holes of piston and conrod small end.

Note: When installing the piston, the “IN” mark on piston top is located to the intake side.

- Place a clean rag beneath piston and install piston pin circlip ①

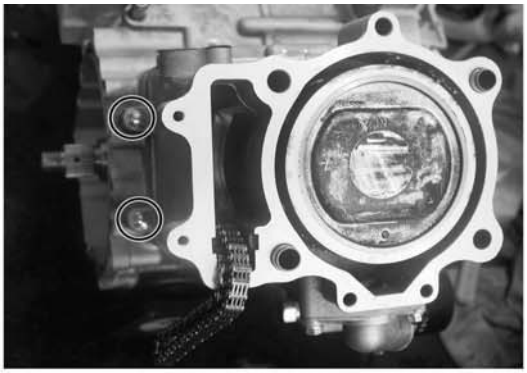
Note: while rotating crankshaft, pull the cam chain upward, or the chain will be caught between sprocket and crankcase.



- Install the dowel pins and the new cylinder gasket;

Note: Use a new cylinder gasket to prevent oil leakage

Cylinder

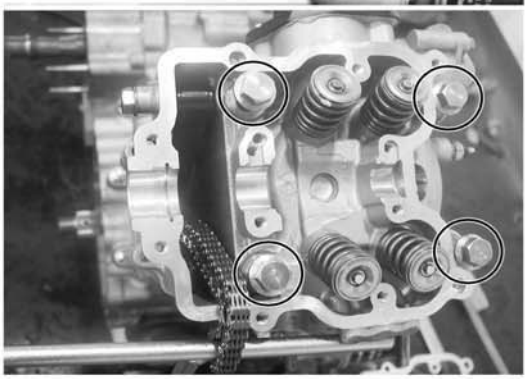


- Apply engine oil to piston skirt and cylinder wall;
- Hold each piston ring with proper position, insert piston into the cylinder;
- Tighten the cylinder base bolts temporarily;

Note: When installing the cylinder and cylinder head, pull the cam chain upward, or the chain will be caught between sprocket and crankcase.

- Install chain guide ;①
- Fit the dowel pin and new cylinder cover gasket;

Note: Use a new cylinder cover gasket to prevent oil leakage



Cylinder Head

- Install the cylinder cover, tighten the cylinder head bolts diagonally to the specified torque.

Cylinder head bolt tightening torque: Initial: 25 N·m
Final: 38 N·m

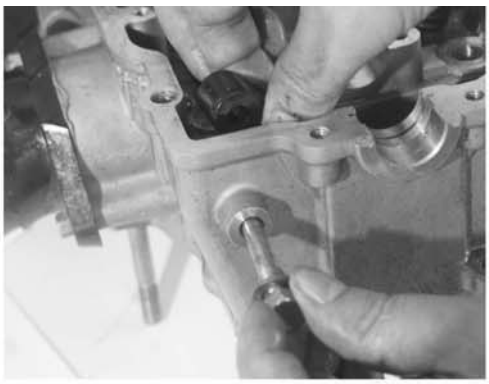
- Tighten the cylinder head nuts to the specified torque;

Cylinder head nuts tightening torque:
M6: 10 N·m
M8: Initial 10 N·m
Final 25 N·m

Tighten the cylinder top nuts and cylinder base to the specified torque;

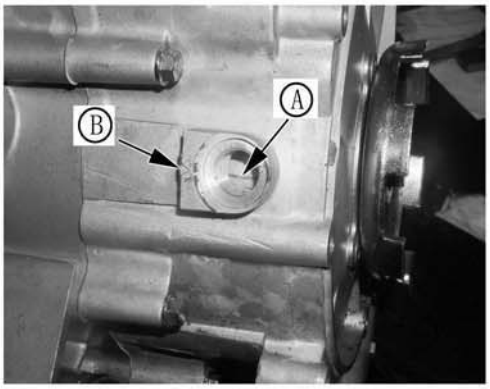
Tightening torque: 10 N·m

- Install chain tensioner;



Camshaft

- Align mark “A” on magneto rotor with mark “B” on crankcase;

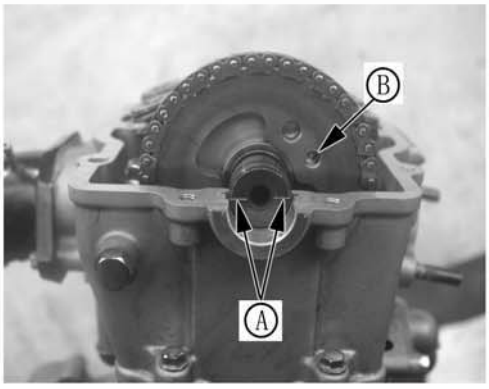


Note:while rotating crankshaft, pull the cam chain upward, or the chain will be caught between sprocket and crankcase.

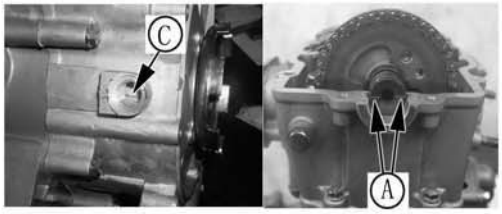
- Align the mark “A” on the camshaft so that they are parallel with the mating surface of the cylinder head.

Note: Do not rotate the magneto rotor while doing this.when the sprocket is not positioned correctly, turn the sprocket;

- Engage the chain on the sprocket with the locating pin “B” as illustrated on the right;



- Recheck if the position of mark “A” and “C” is correct. If not, reassemble until it is correct.

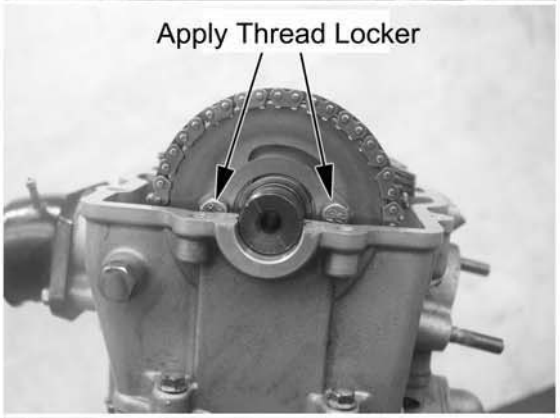


- Install crankshaft C-ring ①

- Install lock washer so that it covers the locating pin;
- Apply thread locker to the bolts before installing, and tighten them to the specified torque;

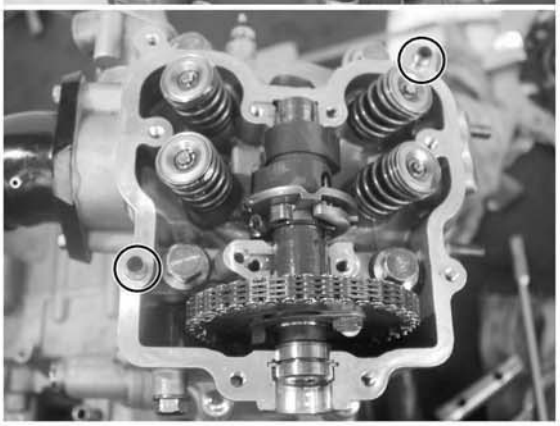
Sprocket bolt tightening torque: 15 N·m

- Bend up the lock washer to lock the bolts.



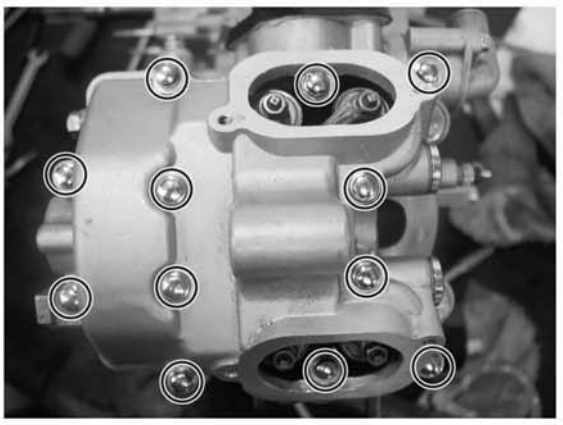
Cylinder Head Cover

- Clean the mating surface of cylinder head and cylinder head cover;
- Install dowel pin to the cylinder head
- Apply sealant to the mating surface of the cylinder head cover;



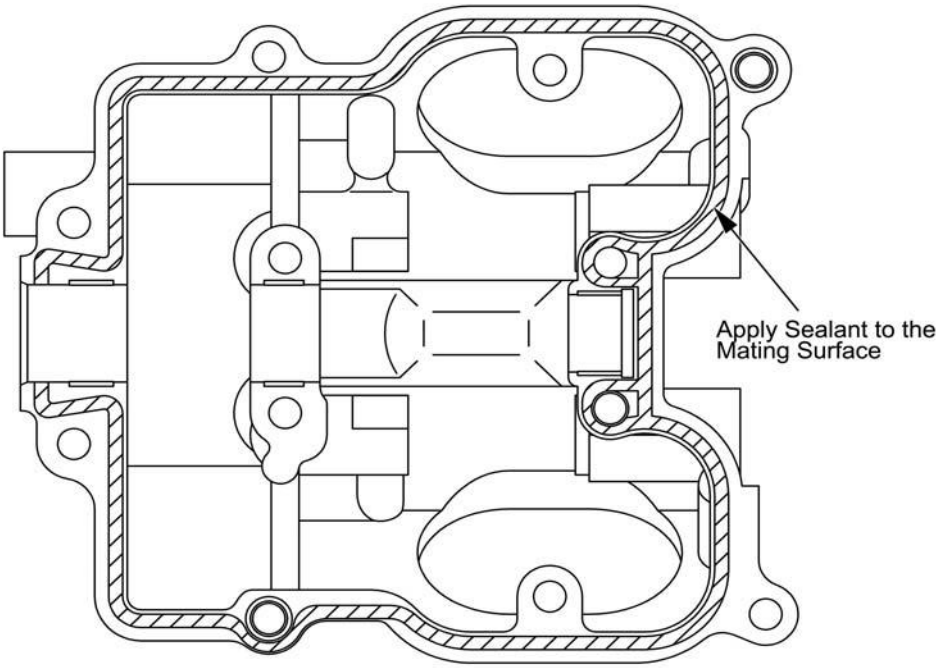
- Install cylinder head cover bolts, tighten diagonally to the specified torque.

Cylinder head cover bolt tightening torque: 10 N·m



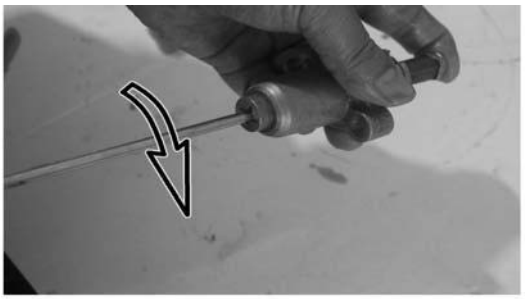
Note: When tightening the cylinder head cover bolts,the piston must be at top dead center on the compression stroke.

Gasket Sealant Applying Place



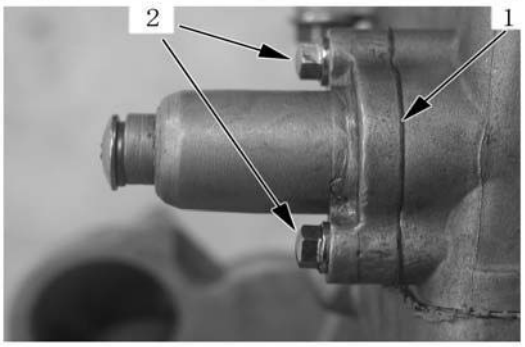
Chain Tensioner

- Insert (--) screwdriver into slotted end of chain tension adjuster, turn it clockwise to lock the tensioner spring;

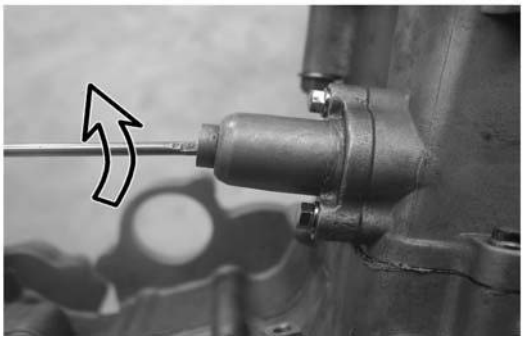


- Install the chain tensioner and the new washer 1;
- Install the bolt 2, tighten it to the specified torque;

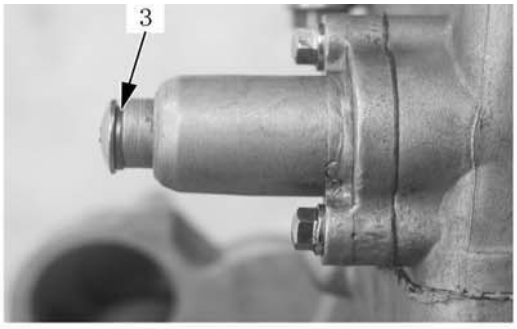
Chain tensioner bolt tightening torque: 10 N·m



- After chain tensioner is installed, turn the (--) screwdriver counter clockwise. The tensioner rod will be advanced under spring force and push tensioner against chain.



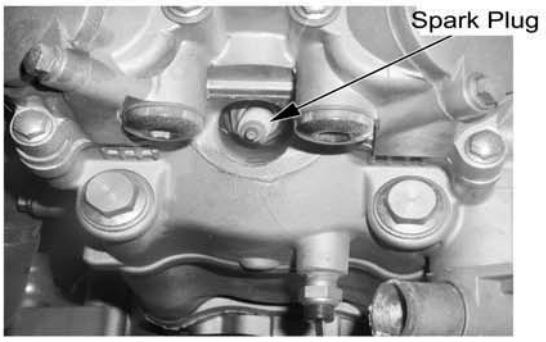
- Install the new gasket 3;
- Install chain tensioner screw, tighten it to the Specified Torque



Chain tensioner screw tightening torque: 8 N·m

Valve Adjuster Cover

- Refer to 11-3 for valve clearance;
- Use new rubber gasket and apply grease;
- Install Valve Inspection Cap
- Install valve inspection cap bolt;

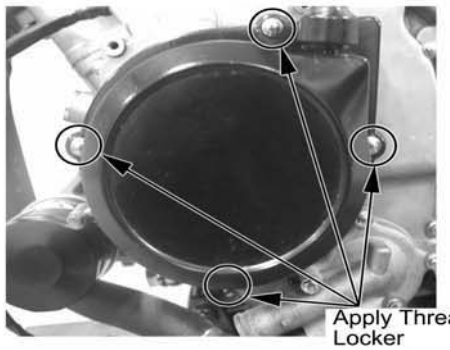


Spark Plug

- Install spark plug with special tool and tighten to the specified torque;

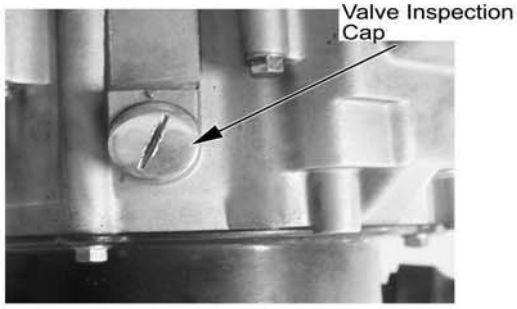
> **Note:** To avoid damage to the cylinder head thread, screw in the spark plug with hand first, then tighten it to the specified torque with spark plug wrench.

Spark plug tightening torque: 18N.m
Tool: Spark Plug Wrench



Engine Periphery

- Recoil Starter
- Install recoil starter
- Apply thread locker to the bolts and then tighten;



Valve Inspection Cap

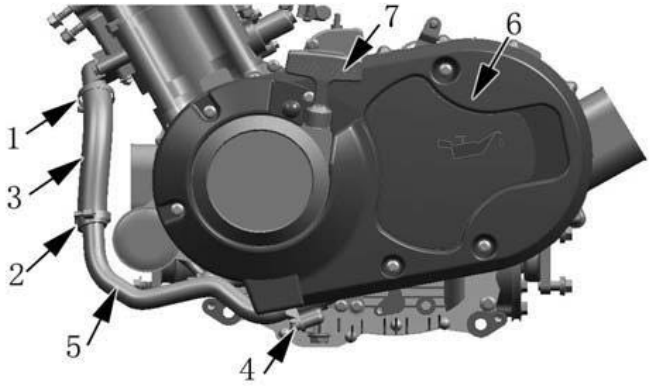
- Install valve inspection cap

Left Plastic Cover

- Install left plastic cover 6

Water Pipe and Hose

- Install water hose 5
- Install bolt 4
- Install water hose 3
- Install clamp 1 and 2



Overhaul Info……7-2

Carburetor Removal……7-3

Inspection……7-4

Measurement and Adjustment……7-5

Carburetor Assembly……7-6

Carburetor Installation……7-7

Carburetor Parameters……7-7

High Pressure Fuel Line Disassembly/ Installation……7-8

Throttle Body Disassembly/Installation……7-8

Fuel Injector Assy Disassembly/Installation……7-9

Fuel injector Assy Removal/Assembly……7-9

Idle Air control valve Disassembly/Installation……7-9

Overhaul Info

CAUTION

NOTE

Gasoline is highly flammable, therefore smoke and fire are strictly forbidden in the work place. Special attention should also be paid to sparks. Gasoline may also be explosive when it is vaporized, so operation should be done in a well-ventilated place.

Do not over twist or bend the cables. The twisted cables may cause poor operation.

Loose the high pressure fuel line before disassembly, discharge the fuel in the high pressure fuel line and put it in a container.

When the body of throttle valve is disassembled, the air intake shall be covered by dishcloth or tape, for avoiding the entry of other objects into the engine from the air intake side of the engine.

When the vehicle will be stored for more than one month, the gasoline in the high pressure fuel line and cap of the fuel injector must be discharged. Otherwise, the gasoline will age and form colloidal elements which may block the nozzle of fuel injector, therefore the engine cannot start or the rotate speed is unstable.

Overhaul Info

Engine Starting Failure

Too much fuel in the engine.

-Ail filter clogged.

-Idle air pipe clogged.

No fuel in the injector.

-Fuel filter clogged.

High pressure fuel line clogged.

-Fuel injector clogged.

Hard Starting/Stall After Starting, Unsteady Idle Speed

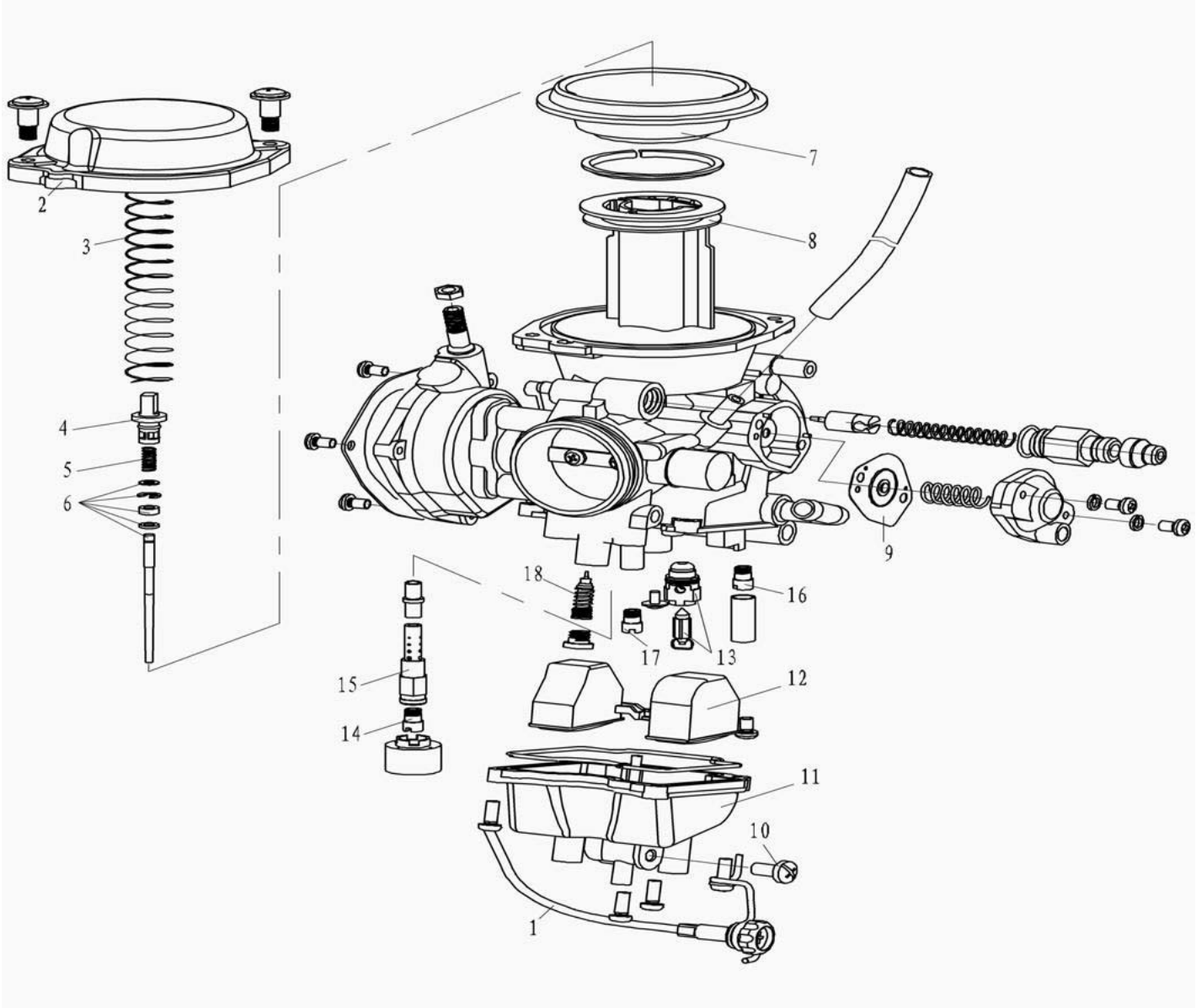
Idle air pipe clogged.

Fuel system clogged.

Ignition system not functioning properly.

Fuel tank cap clogged.

1. Carburetor Removal



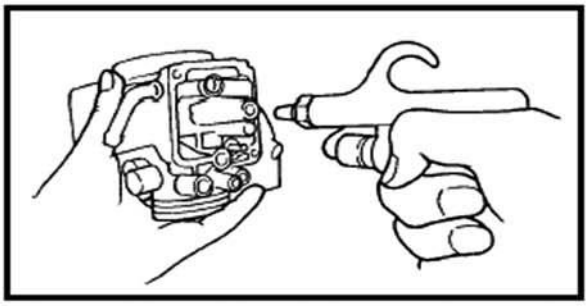
Disassemble the carburetor in the following serial number:

Serial No	Description	Qty	Serial No	Description	Qty
1	Idle Adjust Shaft	1	10	Drain Screw	1
2	Vacuum Chamber Cover	1	11	Float Chamber	1
3	Spring	1	12	Float	1
4	Jet Needle Holder	1	13	Needle Valve Set	1
5	Spring	1	14	Main Jet (MJ)	1
6	Jet Needle Set	1	15	Needle Jet (NJ)	1
7	Vacuum Diaphragm	1	16	Pilot Jet (PJ)	1
8	Piston Valve	1	17	Starter Jet (GS)	1
9	Enriching Diaphragm	1	18	Pilot Air Jet (PAJ)	1

2. Inspection

- Check carburetor body for cracks or damage.

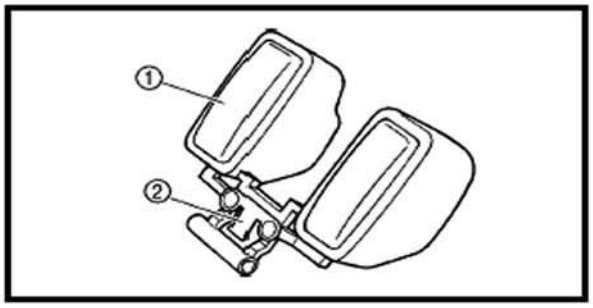
Cracks or damage:→ Replace



- Check carburetor float chamber, fuel passage for dirt or clog. Clean these parts.

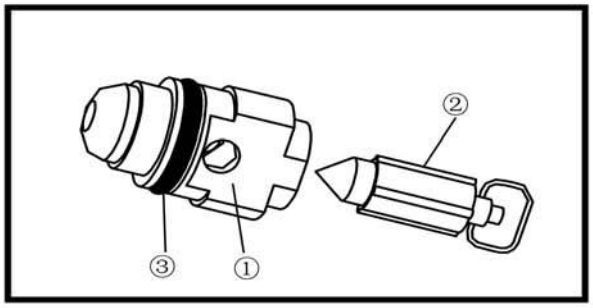
- Check float①, float tang ② for damage.

Damage: → Replace



- Check valve seat①, needle valve②, O-ring③ for damage, abnormal wear or dirt.

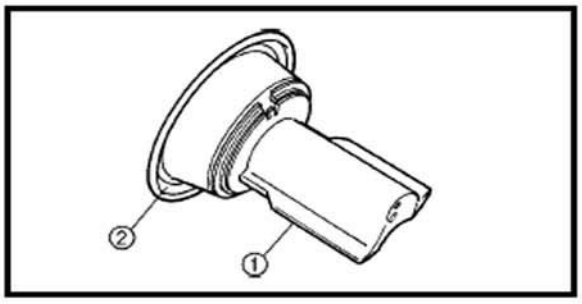
Damage or wear or dirty: → Replace



Note: Valve set①, needle valve② should be replaced as a set.

- Check piston valve① for scratches, abnormal wear or damage.

Scratches, wear or damage: → Replace

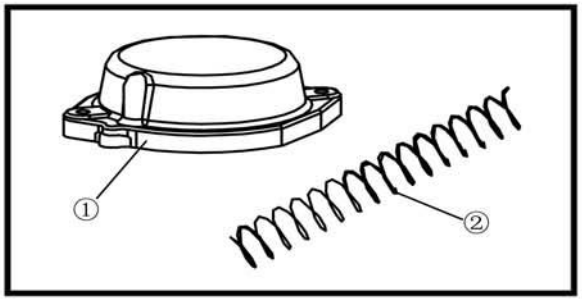


- Check diaphragm② for tears.

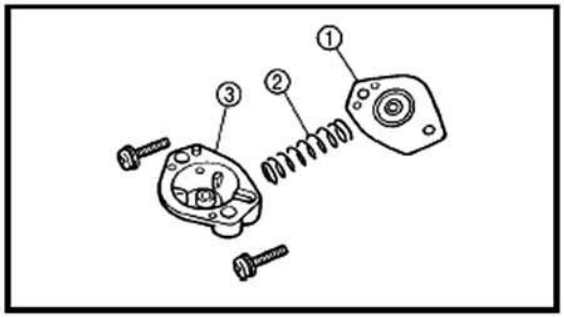
Tears: → Replace

- Check vacuum chamber cover①, spring② for damage or cracks.

Damage or cracks: → Replace



- Check the diaphragm ① for tears;

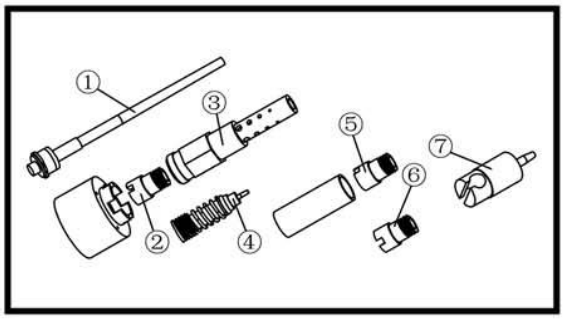


Tears: → Replace

- Check the spring ②,cover ③ for damage and tears;

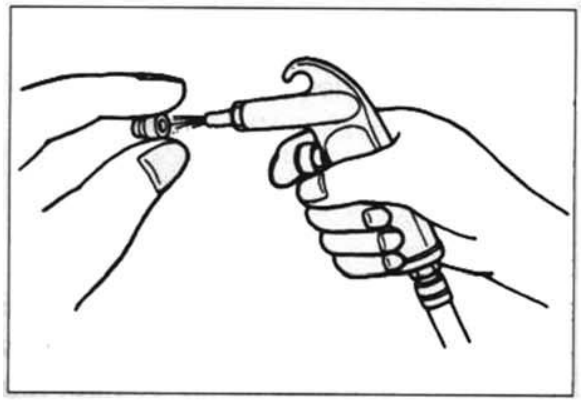
Damage or tears: → Replace

- Check the jet needle , mail jet , needle jet , pilot ③ air jet , pilot jet , starter jet and starter plunger for wear and bends;



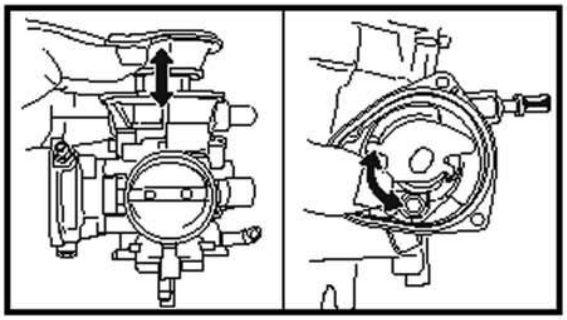
Wear or bends: → Replace

- Check above jets for clog. Blow out the jets with compressed air.



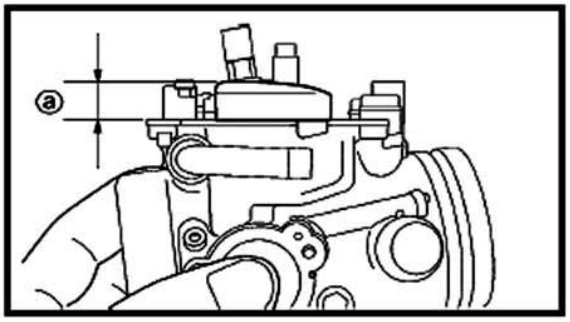
- Insert piston valve into carburetor body and check the free movement;

- Check free movement of throttle valve. Replace with a new one if it's stuck;



3. Measurement and Adjustment

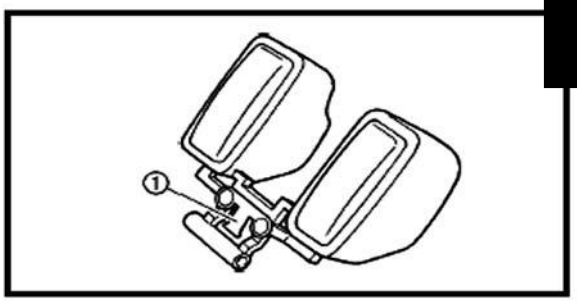
- Keep the carburetor in a upside down position. Measure distance "a" from the mating surface of float chamber (without gasket) to the top of float.

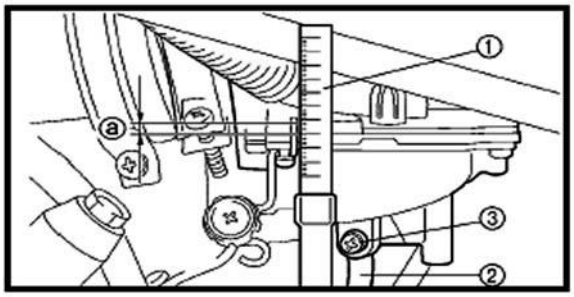


Note: The float arm should rest on the needle valve. Do not compress the needle valve.

Float Height: 10±1mm

- If float height is not within the specification, check the valve seat and needle valve;
- If either of valve seat or needle valve is worn, replace both;
- If both are fine, adjust float height by bending the float tang ①on the float;
- Measure float height again till it's within the specification





Fuel Level

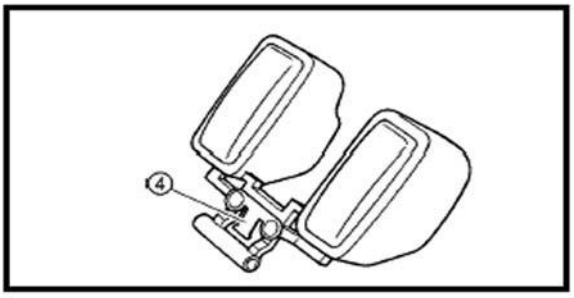
- Place carburetor on a level surface. Connect fuel level gauge① with drain pipe②;

Tool: Fuel Level Gauge

- Loosen drain screw ③
- Keep fuel level gauge vertical next to the float chamber line and read the fuel level "a"

Fuel Level: 3.5±0.5mm

- If the fuel level is not within the specification, adjust the fuel level;
- Remove carburetor
- Check valve seat and needle valve
- If either of valve seat or needle valve is worn, replace both;
- If both are fine, adjust float height by bending the float tang ①on the float;



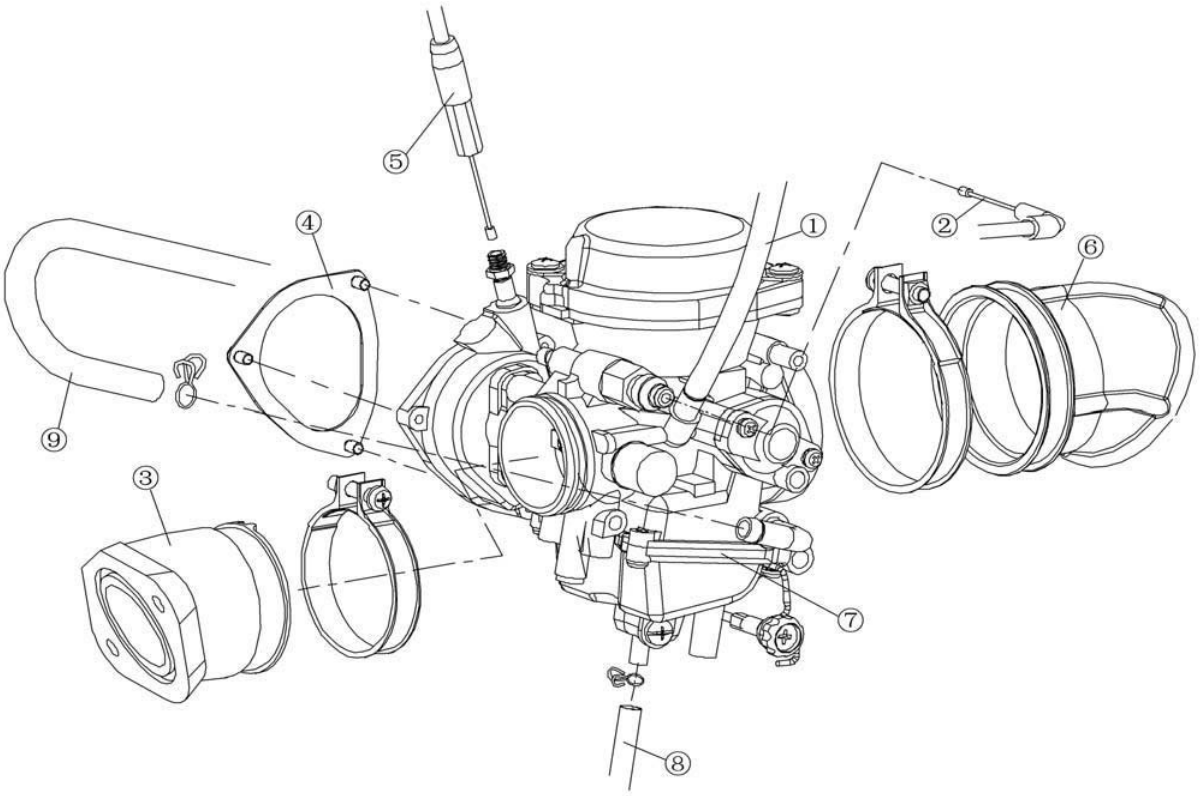
- Install carburetor
- Check again the fuel level

Carburetor Assembly

Reverse the disassembly procedure for assembly

Carburetor Installation

①-vacuum breather hose ②-starter cable ③-carburetor joint (engine intake manifold))
④-throttle valve cover ⑤-throttle cable ⑥-Carburetor joint (air filter)
⑦-carburetor ⑧-drain hose ⑨-fuel inlet hose



Note: Align the installation mark of carburetor and carburetor joint.

6. Carburetor Parameters

Type		MIKUNI BSR36-89
Aperture No.		07G0
Throat size	(mm)	36mm
Pilot	(r/min)	1300 r/min±100 r/min
Float height	(mm)	10±1
Fuel level	(mm)	3.5±0.5
Main jet	(MJ)	N102221-130#
Main air jet	(MAJ)	MD13/24-35#
Jet needle	(JN)	J8-5E26
Needle jet	(NJ)	785-401011-P-OM
Pilot jet	(PJ)	N224103-22.5#
Pilot screw	(PS)	604-16013-1A
Pilot air jet1	(PAJ1)	MD13/24-65#
Pilot air jet2	(PAJ2)	N211100-165#

High Pressure Fuel Line Disassembly

Loosen the special fuel line clamp on fuel injector cap.
loosen the special fuel line clamp on fuel tank.
Disassemble High pressure fuel line.

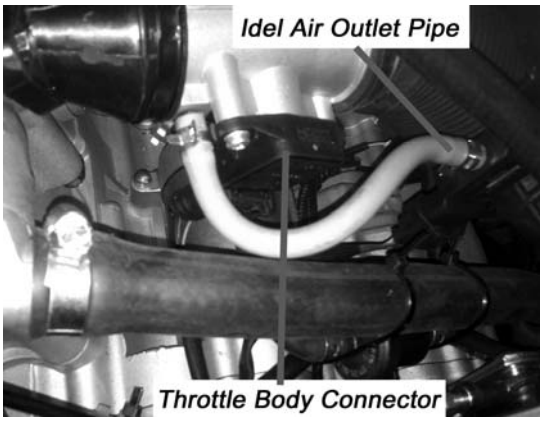
NOTE:Use container to keep the remaining fuel from high pressure fuel line, when loosening the special fuel line clamp.

High Pressure Fuel Line Installation

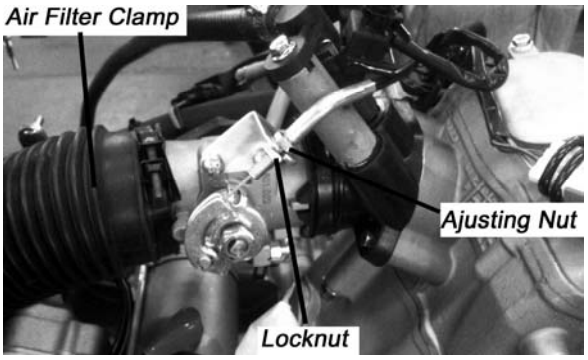
Reverse the disassembly procedure for installation.
Use OETIKER clamp calliper to install the special fuel line clamp.

Throttle Body Disassembly

Loosen the strap and remove throttle valve connector.
Loosen locknut, remove adjust nut and remove the throttle cable from throttle rotory sleeve.
Disassemble idel air outlet pipe on throttle valve.
Loosen air intake connect clamp, air cleaner connect clamp, and remove throttle valve body.



NOTE: Do not adjust the bolt on throttle body.
Do not remove the cap on throttle body.

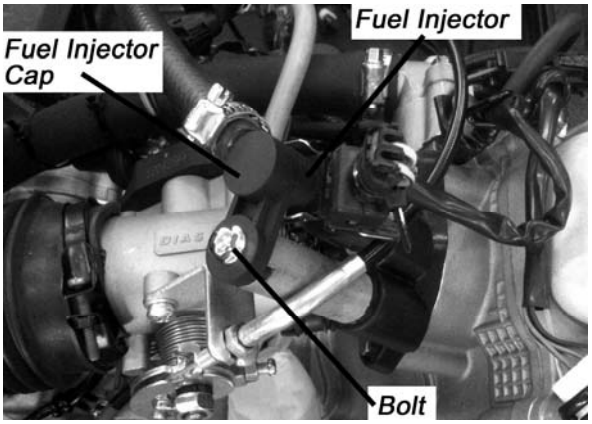


Throttle Body Installation

Reverse the disassembly procedure for installation.

Fuel Injector Assy Disassembly

Disassemble the special high pressure fuel
Remove the strap and fuel injector connector.
Disassemble bolts and remove fuel injector cap and injector.

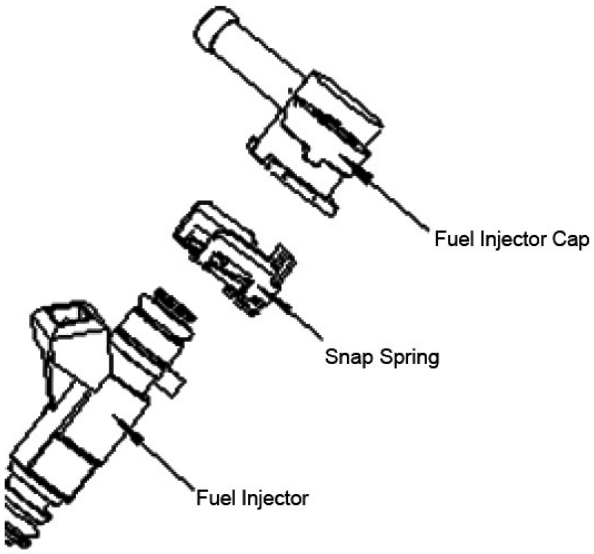


Fuel Injector Assy Installation

Reverse the disassembly procedure for installation.

Fuel Injector Assy Removal

Use thumbs of both hands to push two sides of fuel injector cap snap spring, and then remove it.
Seperate fuel injector cap and fuel injector.

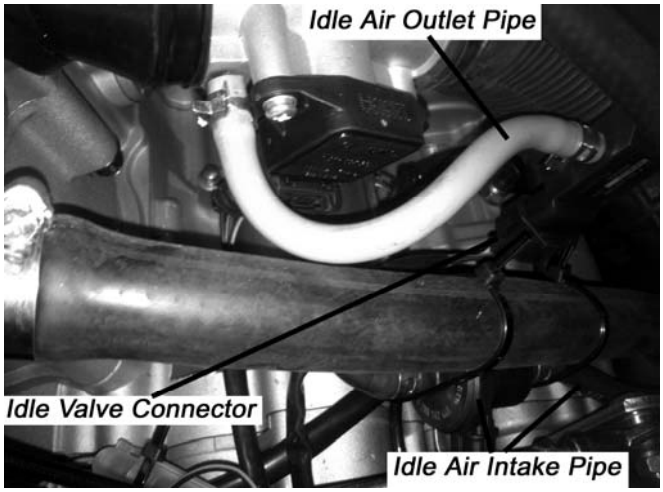


Fuel Injector Assy Assembly

Install fuel injector cap on the fuel injector,
Align the groove of fuel injector cap snap spring to the edge of fuel injector cap;and press the snap spring into it.

Idle Air Control Valve Disassembly

Disassemble idle intake pipe and idle outlet pipe.
Loosen the strap, disassemble idle air control valve and check idle air control valve.
Replace it when there is abnormal noise or it doesnot work.



Idle Air Control Valve Installation

Reverse the disassembly procedure for installation.
Pay attention not to bend the intake and outlet pipe of idle air control valve.

Overhaul Info……..…8-1
Troubleshooting……..…8-2
Front Wheel……...8-3
Brake System……8-4
Suspension……8-7
Steering……8-12

Overhaul Information Operating cautions Notes

- Securely support the vehicle when overhauling the front wheel and suspension system.
- Refer to chapter10 for overhaul and inspection of lighting, instruments and switches.
- Do not overexert on the wheel. Avoid any damage to the wheel.
- When removing tire, use the special tire lever and rim protector.

Maintenance Standard

Item			Standard	Service Limit
	Rim Vibration	Longitudinal	0.8mm	2.0mm
		Lateral	0.8mm	2.0mm
	Tire	Remained groove	–	3.0mm
		Tire pressure	21±1PSI(145±6.9KPa)	–
			28±1PSI(193±6.9 KPa)	–
Front brake	Free play(brake lever)		0mm	–

Tightening Torque		
Nut, Tie-rod	40-45 N·m	
Lock nut, steering stem	45-50N·m	
Nut, front wheel axle	180-200 N·m	
Fixing bolt/nut, absorber（front）	23-25 N·m	
Fixing bolt/nut, absorber（rear）	30-35 N·m	
Nut, front/rear rim	60-65 N·m	
Nut, rear wheel axle	180-200 N·m	

Troubleshooting Heavy

Steering

- Steering bearing is damaged or worn
- Inner & outer bearing races are damaged, worn or stepped
- Steering stem is distored
- Tire pressure is too low
- Worn tire

Shaking Steering Wheel

- Steering wheel is not well tightened
- Steering stem is loosened or not well installed
- Mount seat, steering wheel is not well tightened
- Bearing is damaged
- Right and left shock absorbers are not matched
- Deflected tires
- Deformed frame
- Worn tiers
- Shaking of wheel bearing

Vibration of Front Wheel

- Wheel rim distorted
- Faulty wheel bearing
- Faulty tire
- Improper balance of wheels
- Improper tightening of wheel axle

Wheel Cannot Turn Freely

- Faulty wheel bearing
- Front wheel axle is bended
- Brake drag
- Faulty steering structure

Front Suspension is Too Soft

- Weakened front shock absorbers
- Tire pressure is too low

Front Suspension is Too Hard

- Front shock absorber is bended
- Tire pressure is too high

Noise with Front Absorbers

- Faulty front shock absorbers
- Loosened tightening parts of front absorbers

Poor Brake Efficiency

- Faulty brake adjustment
- Stained brake disc
- Worn brake shoes
- Air in brake hose

Front wheel

Removal
Securely support the front wheels Remove:
--Wheel cap
--4 bolts from wheel hub
--Front wheel

Inspection Rim

Damage, warpage or serious scrapes: →Replace Replace with a new one, if any. Slowly turn the wheel, measure the rim vibra-tion with a dial gauge.

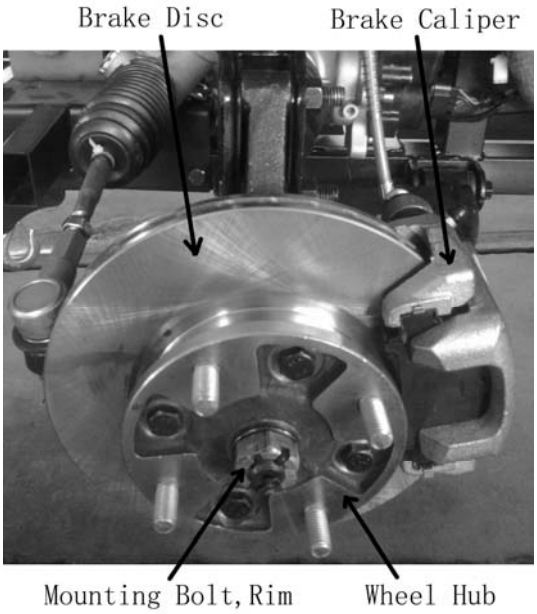
Service limit: Axial: 2.0mm

Radial: 2.0mm

Assembly:

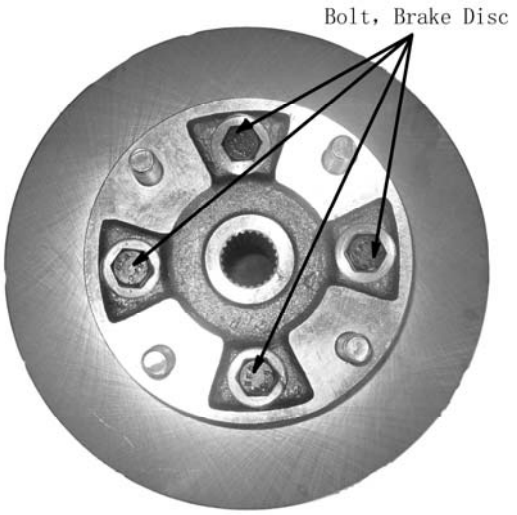
Press rim into wheel
Install rim on the wheel hub

Tightening Torque: Bolt, Wheel Hub：60-65 N·m



Front Wheel Hub

Disassembly
Remove:
--Front wheel(→8-3)
--Front brake caliper(→8-4)
--Rim axle nut
--Brake disc and wheel hub
--4 bolts from front brake disc
--Wheel hub



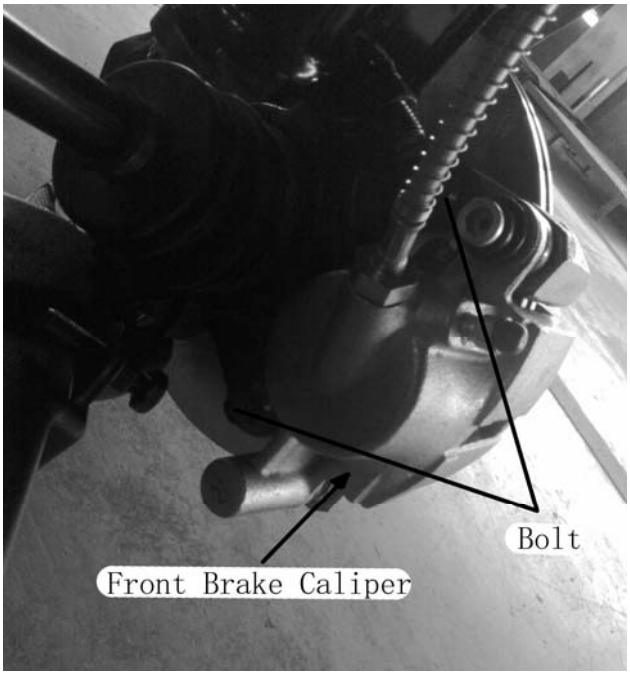
Installation
Reverse the removal procedure for installation.
Torque, Rim axle nut: 180-200N· m

Brake System

Front brake caliper

Removal

Remove:
--Front wheel（→8-3）
--2 bolts from arm
--Front caliper



Inspection

Check brake caliper for cracks and tightening parts for oil leakage.
Replace if any.

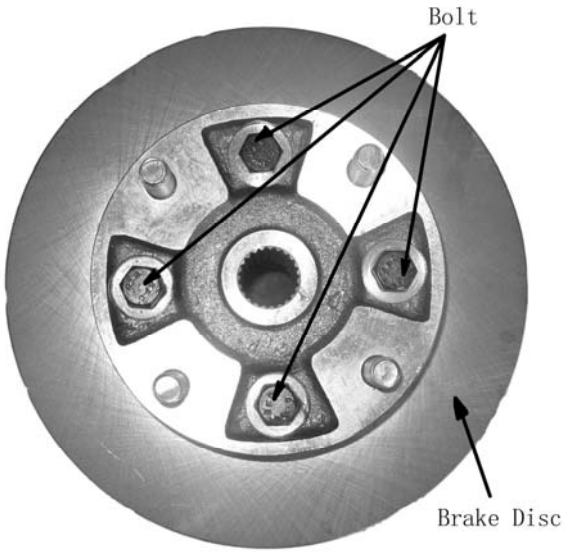
Installation

Reverse the removal procedure for installation.

Tightening Torque

Fixing Bolt, Brake Caliper: 45-50N· m.

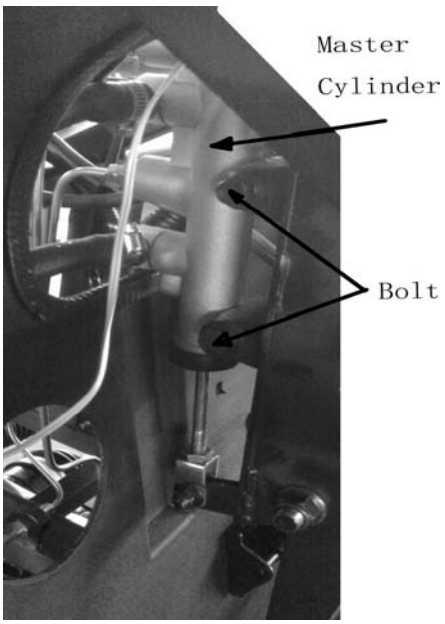
Brake Disc



Removal
Remove:
--Front wheel（→8-3）
--Brake caliper（→8-4）
--Front brake disc and wheel hub
--4 bolts from brake disc
--Brake disc

Inspection:

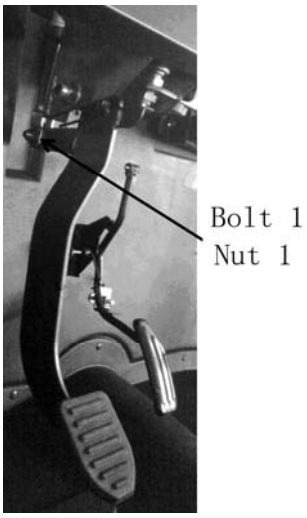
Brake disc thickness: <16mm →Replace



Installation
Install brake disc
Tightening Torque

Fixing bolt, brake disc：45-50N·m

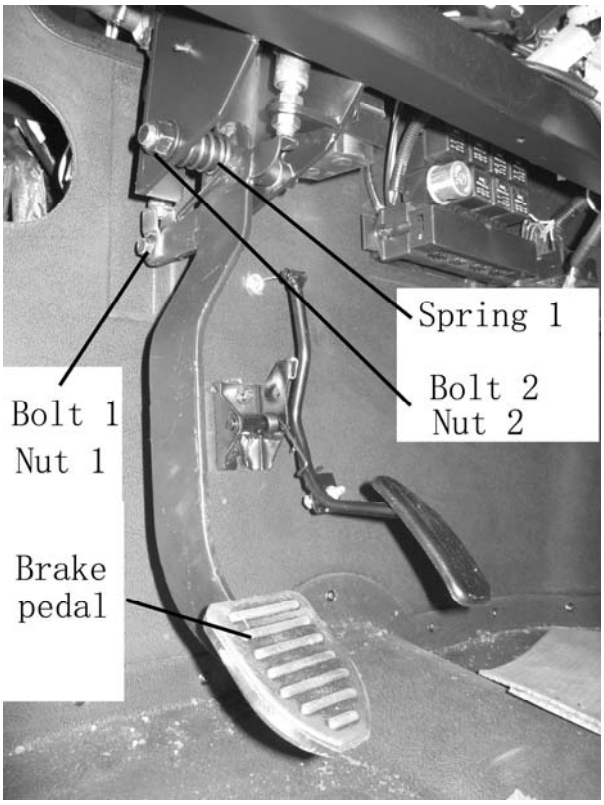
Front Brake Master Cylinder
Disassembly
Remove:
--Blot 1
--Nut 1
Do not remove front brake master cylinder from vehicle unless when replacing master cylinder assembly.



Note:
Do not hang master cylinder on brake hose.
Do not put the master cylinder upside down to avoid possible entrance of air into brake system.
Keep the master cylinder in the installation position.
Refer to Chapter1 for proper routing of brake hose.
Check brake efficiency after installation.

Brake Pedal Removal

Remove:
--Bolt 1 and Nut 1
-- Bolt 2 and Nut 2
-- Spring1
-- Brake Pedal
Seperate Brake Pedal from vehicle
Disassembly of front brake master cylinder
（→ 8-5 ）

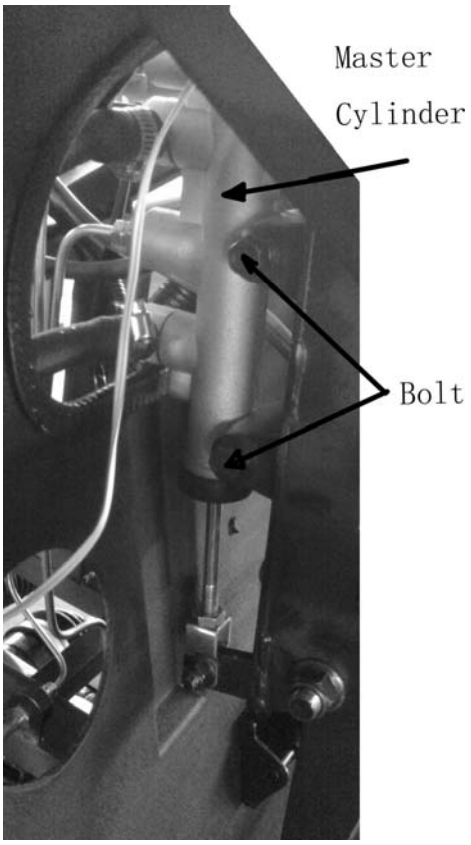


Installation

Reverse the removal procedure for installation.

NOTE

Do not put the master cylinder upside down to avoid possible entrance of air into brake system.
Keep the master cylinder in the installation position.
Refer to Chapter1 for proper routing of brake hose.
Check brake efficiency after installation.



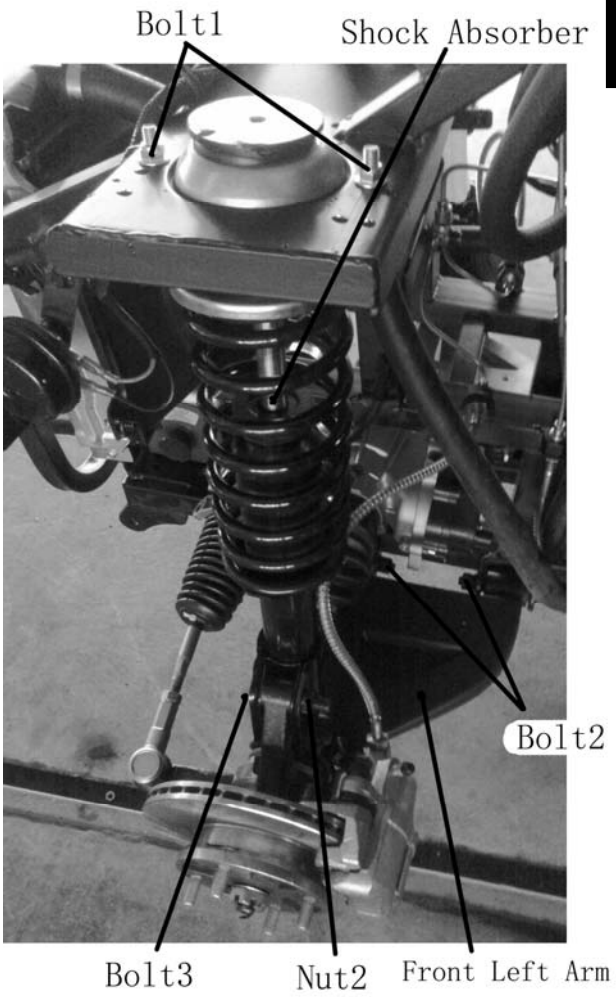
Front Left Suspension

NOTE:

DO NOT
Remove both left and right suspension at the same time to avoid fall down of the vehicle.
Park the vehicle on a level ground and securely support front part of the vehicle.

Removal:

Remove:
--Front wheel(→8-3)
--Front wheel hub(→8-3)
--Front brake caliper(→8-4)
--Bolt1, Nut to Bolt1
--Bolt3, Nut to Bolt3

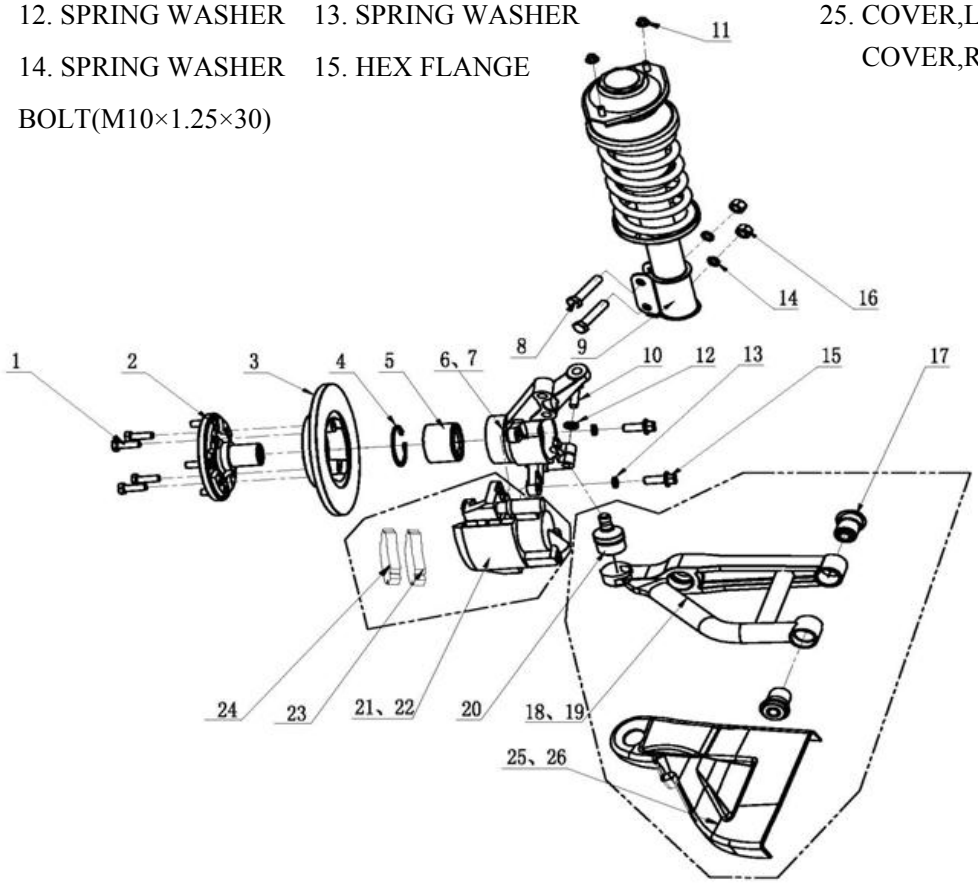


--Bolt2, Nut to Bolt2 for Front Left Arm (Upper)

--Bolt2, Nut to Bolt2 for Front Left Arm (Lower)
--Nut1
--Slotted nut2
--Steering rod

Pull out steering knuckle from constant velocity drive shaft.
Remove front left suspension.

1. BOLT ，(M10×1.25×30) 2. WHEEL HUB 3. GRIP BRAKE 4.HOOP 5. BEARING 6. TRIFURCATE SHAFT (LEFT) 7. TRIFURCATE SHAFT (RIGHT) 8. BOLT(M12×60) 9. FRONT SHOCK ABSORBER 10. BOLT (M10×1.25×40) 11. LOCKING NUT M8 12. SPRING WASHER 13. SPRING WASHER 14. SPRING WASHER 15. HEX FLANGE BOLT(M10×1.25×30) L.FR.LOWER SWING ARM 19. R.FR.LOWER SWING ARM 20. FR.ROCKER BUTTONHEAD 21.CALIPER,BRAKE(L) 22. CALIPER,BRAKE(R) 23. BRAKE PAD（LEFT） 24 .BRAKE PAD （RIGHT） 25. COVER,L.FR.LOWER SWING 26. COVER,R.FR.LOWER SWING



Disassembly

Front Suspension

Removal Note:

Replacing front shock absorber does not require removal of other parts.

Park the vehicle on a level ground and securely support front part of the vehicle. Remove Bolt 8 and Nut 16

Remove front right shock absorber

Inspection
Oil leakage, aged oil seal, damage →Replace
16. NUT(M12) 17. BUFFER COVER 18.

Installation

Reverse the removal procedure for installation.

Refer to Front Right Shock Absorber for removal, installation and inspection of Front Left Shock Absorber.

Rocket Arm

Note: This vehicle has 6 rocket arms. The removal, disassembly, inspection and installation of the 6 rocket arms are the same. This service manual will only introduce the removal, disassembly, inspection and installation of Front Right Arm(Lower). Refer to Front Right Arm(Lower) for removal, disassembly, inspection and installation of other rocket arms.

Front Right Arm

Removal

Remove:
--Front right shock absorber(→8-8)
--Bolt 8 and Nut16
--Bolt7 (27) and Nut3 (29)
--Bolt6 (28) and Nut2 (30)

Remove wheel, brake caliper and wheel hub before removing shock absorber.

Remove steering rod before removing bolts.

Pull out steering knuckle from constant velocity drive shaft before removing front right arm.

Remove Front Right Arm.

Inspection

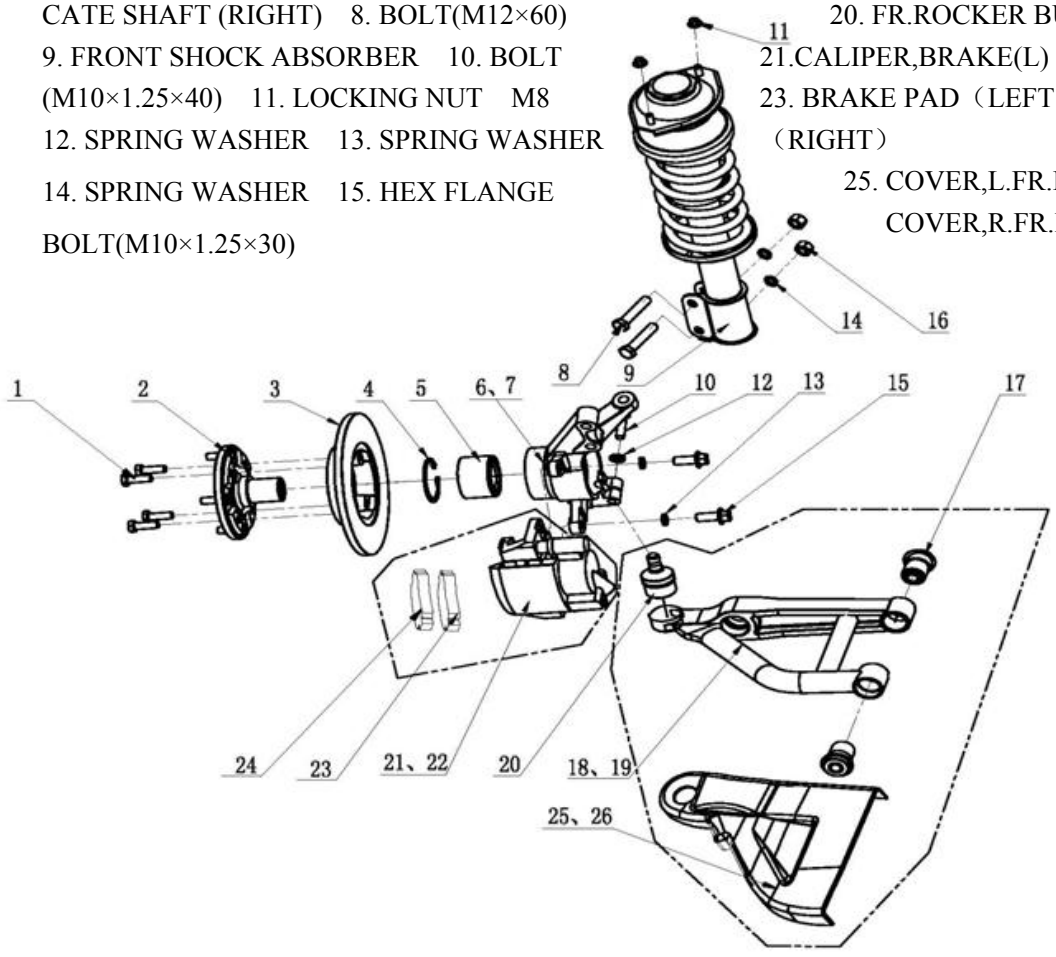
Ball Pin

Check if Lower Ball Pin (20) and Front Right Arm(Lower) (19) can turn freely in all directions.
Check clearance of lower ball pins. Clearance out of range or no free turning:→Replace Ball pin

Right Steering Knuckle

Inspection:
Damaged steering knuckle: → Replace
Check wheel hub bearing for free turning and clearance.
Bearing cannot turn freely or clearance out of range: → Replace

1. BOLT ，(M10×1.25×30) 2. WHEEL HUB 3. GRIP BRAKE 4.HOOP 5. BEARING 6. TRIFURCATE SHAFT (LEFT) 7. TRIFURCATE SHAFT (RIGHT) 8. BOLT(M12×60) 9. FRONT SHOCK ABSORBER 10. BOLT (M10×1.25×40) 11. LOCKING NUT M8 12. SPRING WASHER 13. SPRING WASHER 14. SPRING WASHER 15. HEX FLANGE BOLT(M10×1.25×30) 16. NUT(M12) 17. BUFFER COVER 18. L.FR.LOWER SWING ARM 19. R.FR.LOWER SWING ARM 20. FR.ROCKER BUTTONHEAD 21.CALIPER,BRAKE(L) 22. CALIPER,BRAKE(R) 23. BRAKE PAD（LEFT） 24 .BRAKE PAD （RIGHT） 25. COVER,L.FR.LOWER SWING 26. COVER,R.FR.LOWER SWING



Constant Velocity Drive Shaft

NOTE： The removal, inspection and installation of Left and Right Constant Velocity Drive Shafts of the Front/Rear Axles are the same. The following will give instruction only on the removal, inspection and inspection of Left Constant Velocity Drive Shaft of Front Axle. Refer to Left Constant Velocity Drive Shaft for removal, inspection and installation of other drive shafts.

Left Constant Velocity Drive Shaft, Front Axle

Removal

NOTE: Maintenance of Left Constant Velocity Drive Shaft of Front Axle only does not require removal of Front Suspension.
Remove:
--Front left wheel(→ 8-3)
--Front left brake caliper(→ 8-4)
--Front left wheel hub(→ 8-3)
Check dust boot.
Damaged dust boot: → Replace
Shake constant velocity drive shaft, check the agility of rzeppa universal joint, free turning of bearing, and any gap between rzeppa constant velocity joint and spline.
Stagnated turning, noise, gap with spline:
→ Replace
Warning:
An accident may occur if the rzeppa constant velocity joint cannot turn freely because of the loss of control of wheel steering.

Installation

Press ball pin into arm with special tool.
Reverse the removal procedure for installation.

Note: No shaking with the installed left and right arms. Replace arms if any. Tightening Torque：45～ 50N • m

Steering System

Front Cover, Steering Stem

Removal
Remove cover, steering stem
（→ 2-2）

Combination Switch

Removal

Remove combination switch（→ 2-3）

Rear View Mirror

Removal

Remove left and right rear view mirrors（→ 2-15）

Note: Left rear view mirror is right-threaded.

Turn counter clockwise for removal.

Note: Right rear view mirror is left-threaded.

Turn clockwise for removal.

Steering Stem

Removal

Remove:
--Steering wheel（→ 2-2）

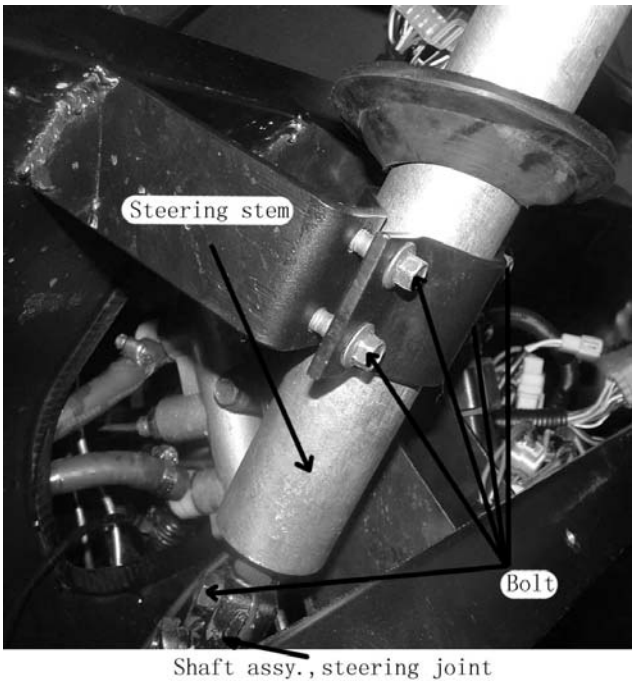
-- cover, steering stem（→ 2-2）

--Combination switch（→ 2-3）

--Bolt

--Shaft assy., steering joint

--Steering stem



Shaft assy.，steering joint

Installation of Combination Switch

Install combination switch（→ 2-3）

Insert main cable with connector of combination switch.

Installation of Steering

Wheel

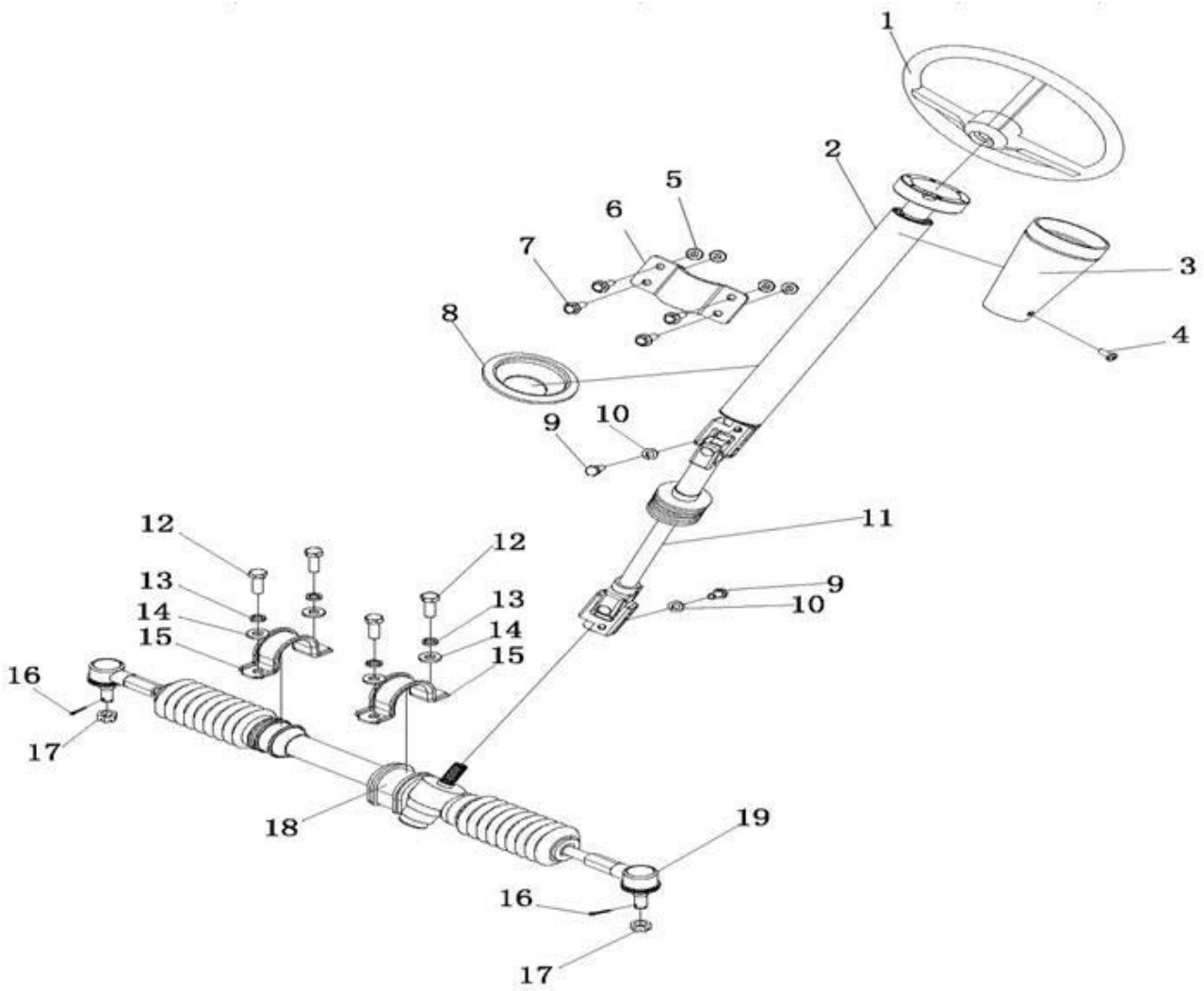
Install steering wheel（→ 2-2）

Installation of Rear View Mirror

Install rear view mirror（→ 2-15）

Steering System

1. STEERING WHEEL 2. STEERING COLUMN 3. DECORATE COVER,STEERING COLUMN 4. SCREW（M6×12） 5. LOCKING NUT(M8) 6. HOLDER,STEERING COLUMN 7. BOLT，FLANGE(M8×35) 8. RUBBER CUSHION,COLUMN



9.BOLT(M8×25) 10. SPRING WASHER 11. STEERING JOINT 12. BOLT(M10×30) 13. SPRING WASHER(Φ10) 14. GASKET(Φ10) 15. HOOP，STEERING COLUMN（IRON） 16. PIN , SPLIT（3.5×16） 17. SOLT NUT(M12) 18. HOOP，STEERING COLUMN （LEATHER） 19. STEERING ASSY

Overhaul Info……9-1
Troubleshooting……9-2
Rear wheel……9-3
Rear brake……9-4
Rear suspension……9-5

Overhaul info:

Note:

- Securely support the vehicle when overhauling the rim and suspension system.
- Use genuine parts of bolts and nuts for rear rim and suspension.
- Do not overexert on the wheels to avoid possible damage to the wheels.
- When removing tire from rim, use special tire lever and rim protector to avoid damage to the rim.

Overhaul standard

Item			Standard	Limit
Rear wheel	Rim vibration	Longitudinal	-	2.0mm
		Horizontal	-	2.0mm
	Tire	Remained Tire Tread	-	1.6mm
		Tire pressure(front)	21±1PSI(145±6.9KPa)	-
		Tire pressure(rear)	28±1PSI(193±6.9 KPa)	-
Rear brake	Brake pedal Free Play		0mm	-

Tightening torque	
Rear wheel axle nut	180-200N.m
Rim mounting bolt	60-65N.m
Front mounting bolt, Shock absorber	23-25N.m
Rear mounting bolt, Shock absorber	30-35N.m

Troubleshooting

Rear wheel wobbles

- Rim warpage
- Faulty tire.
- Tire pressure too low
- Improper wheel balance
- Improper tightening of wheel axle nut
- Loosened wheel nut

Rear shock absorber is too soft

- Weak spring.
- Oil leakage from rear shock absorber

Rear shock absorber is too hard.

- Bent rear shock absorber
- Tire pressure is too high

Poor brake efficiency

- Improper brake adjustment
- Stained brake pad or brake disk
- Worn or damaged brake pad

Rear wheel removal:

Refer to front wheel remove.（→8-3）

Inspection Rim:

Damage, warpage, serious scrapes, etc. Replace if necessary.

Slowly turn the wheel, measure the rim vibration with a dial gauge.

Service limit：Axial: 2.0mm

Radial: 2.0mm

Installation:

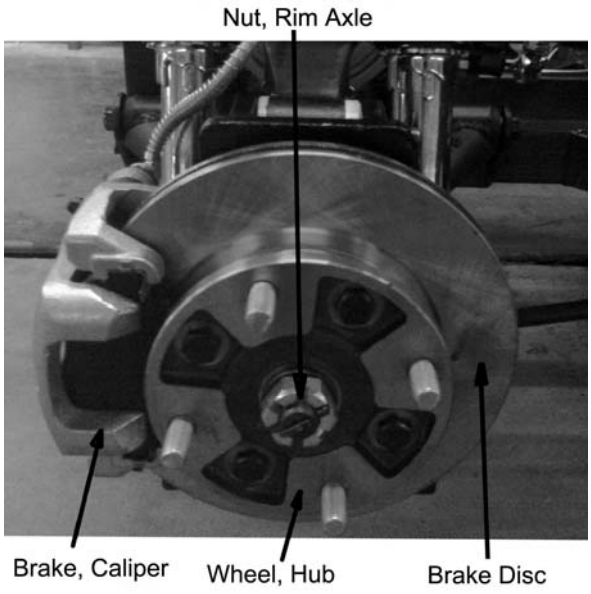
Refer to front wheel installation.（→8-3）

Wheel hub removal:

Remove rear wheel（→9-3）;

Remove axle nut;

Remove wheel hub;



Installation:

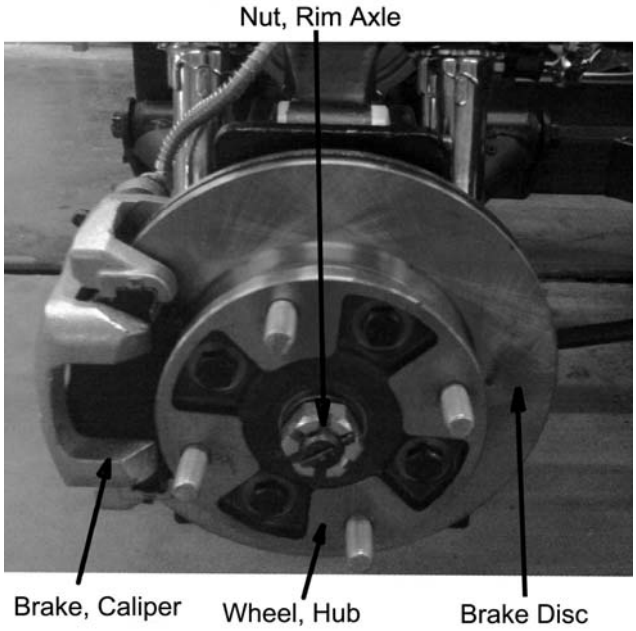
Reverse the removal procedure for installation

Tightening torque, Rim Axle Nut：180-200N.m

Rear Brake

Rear Brake Caliper

- Remove:
- Rear left wheel（→9-3）
- 2 bolts from arm
- Brake caliper



Inspection:

Brake Caliper:

Cracks, Oil leakage: → Replace

Installation

Reverse the removal procedure for installation.

Note:

Refer to Chapter 1 for brake hose routing.

Rear Brake Disc

Remove:

- Rear left wheel（→9-3）
- Remove axel nut;
- Remove wheel hub;
- Rear brake caliper (→9-4)
- Rear brake disc（→8-3）

Inspection Brake Disc:

Thickness< 16mm: →Replace

Installation

Reverse the steps of removal for installation.

Note:

Refer to Chapter 1 for brake hose routing.

Parking caliper

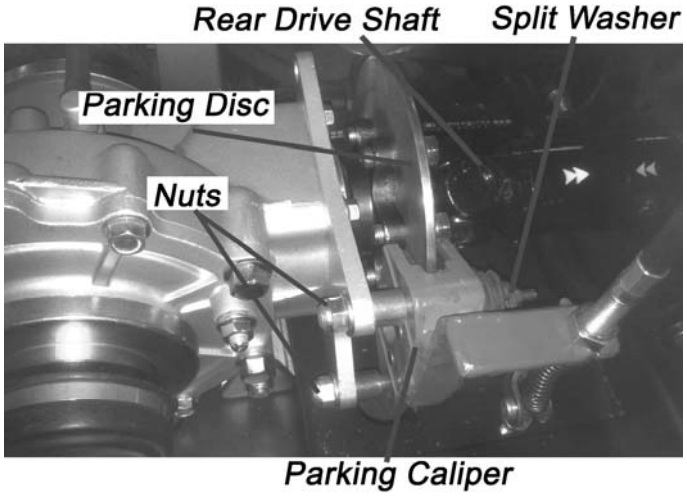
Remove rear wheel（→9-3）

Rear drive shaft

Remove two nuts

Remove parking caliper

Remove parking disc

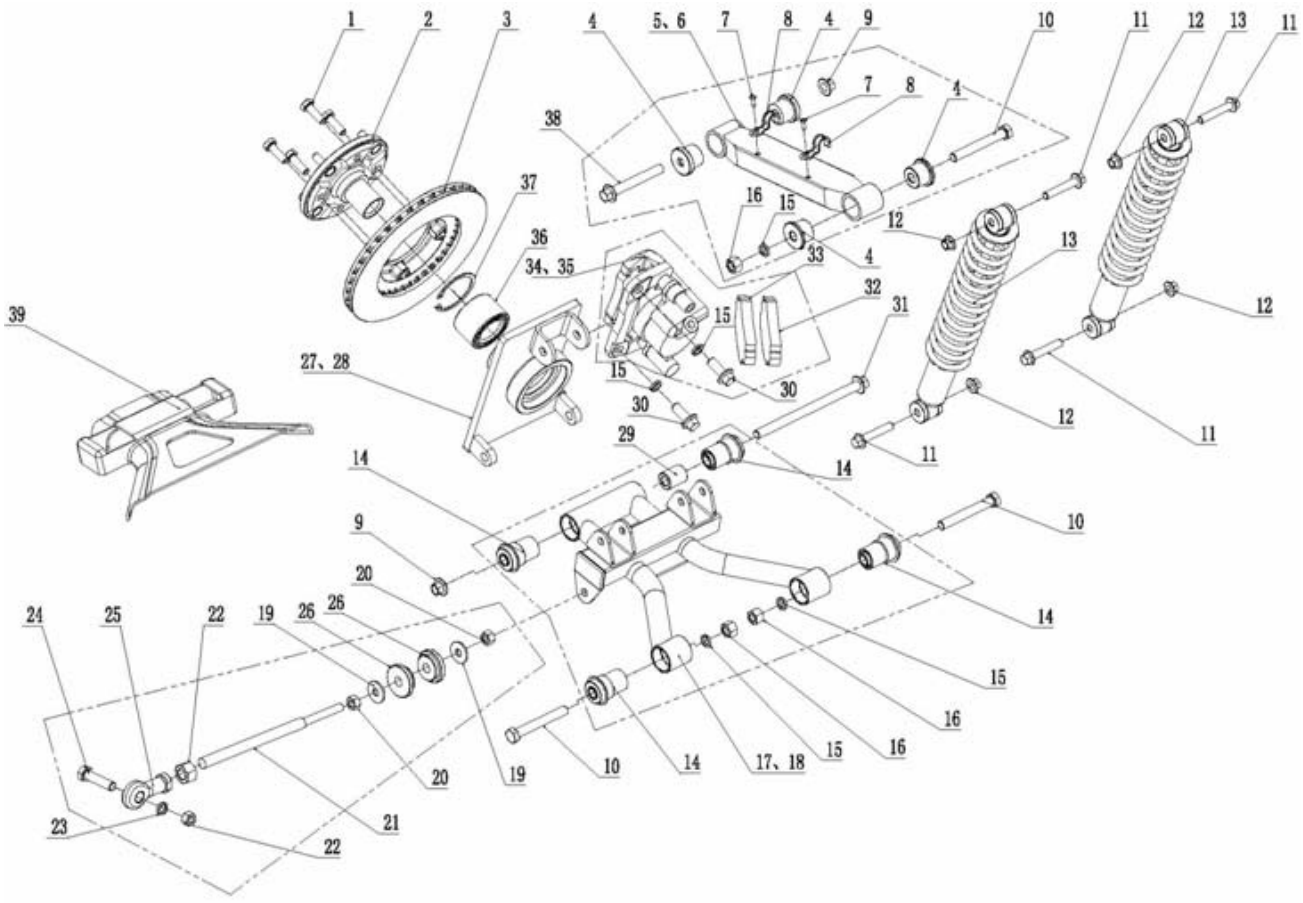


Rear Suspension System

Rear Right Suspension

NOTE

DO NOT remove both left and right suspension at the same time to avoid fall down of the vehicle.



1.BOLT ，(M10×1.25×30) 2. WHEEL HUB 3. REAR BRAKE DISC 4. BUSH（THICK） 5. UPPER SWING ARM（L）6. UPPER SWING ARM（R） 7. TAPPING SCREW(ST4.2×10) 8. WIRE CLAMP 9. LOCKING NUT (M12×1.25) 10. BOLT(M12×90) 11. BOLT，FLANGE (M10×1.25×55) 12. LOCKING NUT (M10×1.25) 13. REAR SHOCK ABSORBER 14. BUFFERING COLLAR 15. SPRING WASHER (Φ12) 16. NUT（M12） 17. REAR LEFT ARM (LOWER) 18. REAR RIGHT ARM (LOWER) 19. WASHER(Φ12) 20. NUT (M10) 21. STABILIZER Bar 22. NUT(M14) 23. SPRING WASHER (14) 24. BOLT(M14×50) 25. JOINT BEARING 26. RUBBER GASKET 27. FLANG，REAR WHEEL（LEFT） 28. FLANG，REAR WHEEL（RIGHT） 29. CENTER SPACER 30. BOLT，FLANGE (M12×1.25×30) 31. BOLT，FLANGE (M10×1.25×180) 32. BRAKE PAD（LEFT） 33. BRAKE PAD（RIGHT） 34.CALIPER,BRAKE(L) 35. CALIPER,BRAKE(R) 36. BEARING（DAC3562） 37. HOOP 38. BOLT，FLANGE(M12×1.25×90) 39. COVER,REAR RIGHT ARM (LOWER)

Disassembly

Stabilizer Bar

Remove:

Bolt (24), Spring Washer (23), Nut (22), Nut (20), Washer (19)
Rubber Gasket(26)

Remove Stabilizer Bar .

Installation:

Reverse the removal procedure for
installation

Right rear absorber

Removal:

Note: Securely support the vehicle when removing rear left and right absorbers.

Maintenance of rear absorbers only does not require removal of rear suspension.

Remove the following parts for rear right shock absorber:

(11) Bolt
(12) Nut
(11) Bolt
(12) Nut

Remove rear right shock absorber.

Installation:

Reverse the removal procedure for installation.

Rear Right Arm

Refer to **front right Arm** in Chapter 8 for the removal, inspection and installation of **Rear Right Arm**

Rear Left Suspension

Refer to **Rear Right Suspension** for the removal, inspection and installation of **Rear Left Suspension.**

Front/Rear Axle Overhaul Information

● Standard

Lubricating Period				
Item		Capacity	Replaced	
			Initially	Afterwards
Front Axle	SAE15W/40 SF or SAE80W/90 GL-4	I:0.33L/R: 0.28L	350km	5000Km
Rear Axle		I:0.30L/R:0.25L		

I= Initial, R=Replaced

Tightening Torque Table				
Item	Qty	Type	Torque(N.m)	Remark
Fornt axle bolt	6	M8×28	25	
Screw	4	M8×20	13	
Screw	1	M8×10	13	
Front screw	1	M14×1.5	62	Glue
Bolt	6	M10×1.25×22	45	
Front axle bolt	1	M14×1.25×12	25	
Bolt	1	M10×1.25	25	
Bearing Retainer	1	M64×1.5×7	80	
Rear axle bolt	2	M10×1.25×25	40	
Rear axle bolt	4	M8×25	25	
Nut	1	M12×1.25	70	
Bolt	4	M8×30	25	
Bearing Retainer	1	M65×1.5×10	70	
Nut	1	M8	16	
Rear axle bolt	1	M20×1.5×12	25	
Rear drain bolt	1	M14×1.25×12	25	

Inspection & Overhaul

Inspection and overhaul if any of problems below happens to front and rear axle.

Descriptions	Causes
1. Unstable moving during accelerating, decelerating or constant speed. 2. Abnormal sound in front rear axle; 3. Engine power transmission failure to front or rear wheels.	A. Bearing broken; B. Gear clearance over/under size; C. Gear severely worn; D. Gear blocked; E. Drive shaft broken F. lack of lubricant G. Foreign matter in front or rear gear

Note：A、B、C problems are hard to distinguish. Analysis is needed based on actual break-down catagories. Make sure engine works all right before disassembly of front or rear axle

Observation and Judgement

1. Never ignore abnormal sound:

a. Abnormal sounds during accelerating, decelerating have little to do with engine working, but possibly with gear worn.

b. Constant abnormal sounds during accelerating or decelerating might be cause by gear clearance wrongly adjusted during assembling.

Note: Wrong assembly or adjustment of the front or rear axle will aggravate gear worn and block;

c. Slight sounds will be noticed during low-speed driving, and should not be heard during high-speed driving. This is caused by gear block.

Note：In case of above mentioned times, stop the vehicle immediately for inspection until they are solved, or will cause accident.

2. Check lubrication;

3. Check lubricant leakage;

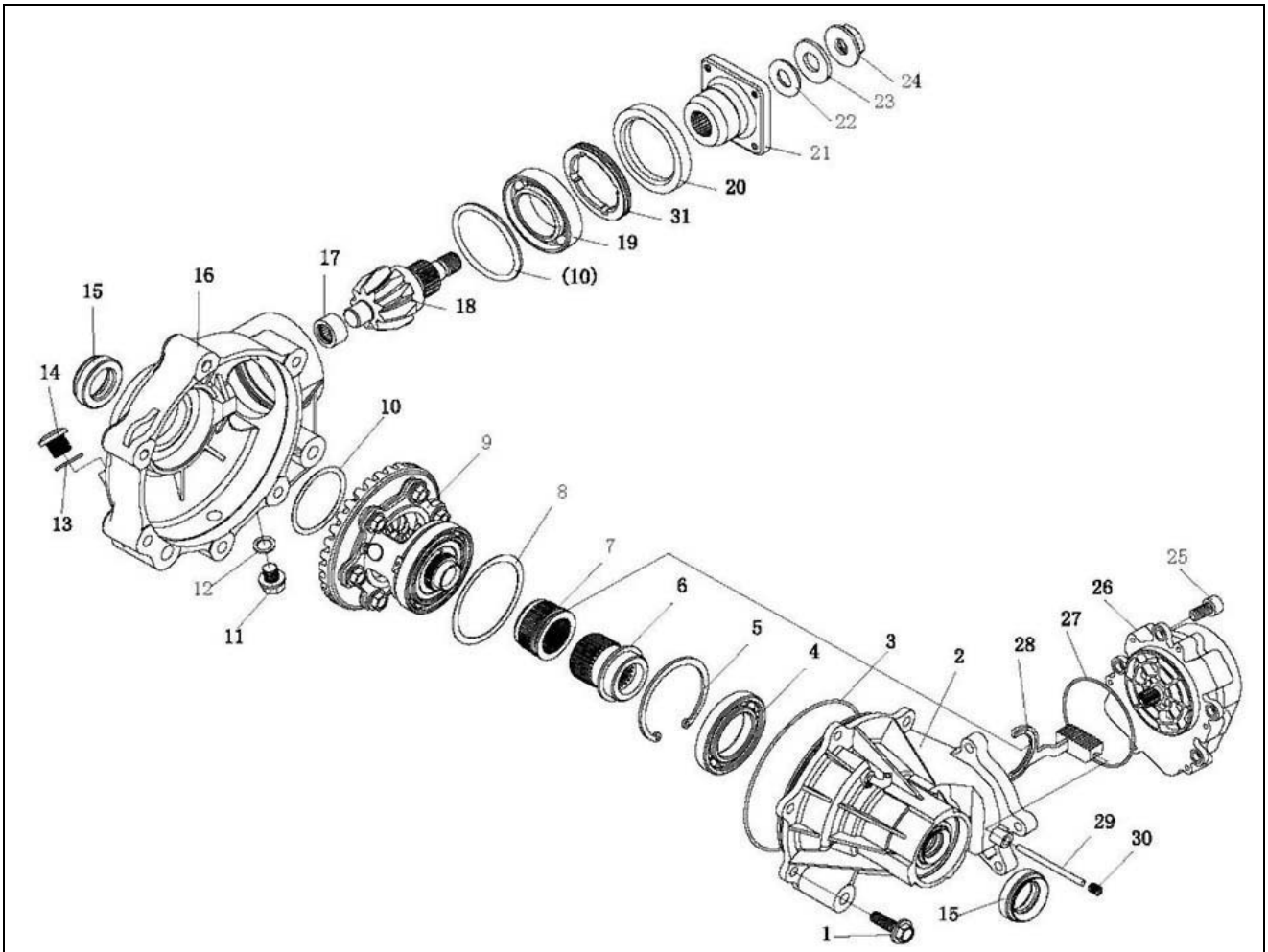
a. Rear axle surface oil stain inspection before through inspection;

b. Oil stain on ground on the parking lot;

c. Lubricant splash inspection. Check if there is gear case or oil seal leakage.

Replace broken parts if necessary.

Disassembly of front axle



Ref.No	Description	QTY	Ref.No	Description	QTY
1	Bolt M8×28	6	17	Needle bearing 1512	1
2	Front dif gear casecover	1	18	Drive pinion gear	1
3	O-Ring 141×2.4	1	19	Bearing 6007	1
4	Bearing 16007	1	20	Oil seal 18×65×9	1
5	Circlip 62	1	21	Coupler	1
6	Drive clutch cover	1	22	O seal 14×6.8	1
7	Drive clutch	1 ~ 2	23	Nut washer	1
8	Washer ϕ83×71	1	24	Nut washer M14×1.5	1
9	Dif. gear assembly	1	25	Bolt M8×20	4
10	Washer ϕ61×48	2 ~ 4	26	Gear motor	1
11	Bolt M10×1.25	1	27	O seal 81.2×1.9	1
12	Washer 10	1	28	Rack	1
13	Washer 14	1	29	Pin roll	1
14	Bolt M14×1.25	1	30	Screw M8×10	1
15	Oil seal 24×38×8	2	31	Bearing M64×1.5×7 1	1
16	Dif. Gear case	1			1

Inspection after front axle disassembly

- Check if there is damage or crack on the front differential gear case cover and bearing assembling hole is ok. Replace case cover if necessary;

- Check if front axle bearing clearance ok or turning stable, and roll way, steel ball, needle and plate are ok. Replace bearing if necessary.(Using special tools)

- Check if oil seal lips and O-ring shape are ok. Replace if necessary;

- Check cylndrical surface of front axle and oil seal lips. Replace broken parts if necessary;

- Check drive pinion gear and differential gear, inspect worn surface. Replace broken if necessary;

- Check driven gears surface, gear(center)differential, bracket differential wearing situation on the differential gear assembly. Replace parts if necessary;

- Check inside and outside spline washer wearing status in front axle. Replace parts if necessary;

- Check gear motor working status. Replace with new parts if necessary;

Gear motor inspection must be carried out with special equipment or acted on the vehicle;

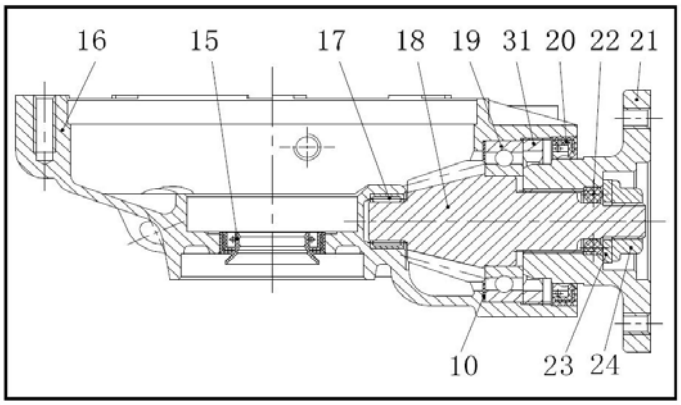
- Check other parts. Replace broken parts of necessary.

Front axle assembly and adjustment

● Front axle case cover assembly

Item“31”tightening torque80Nm

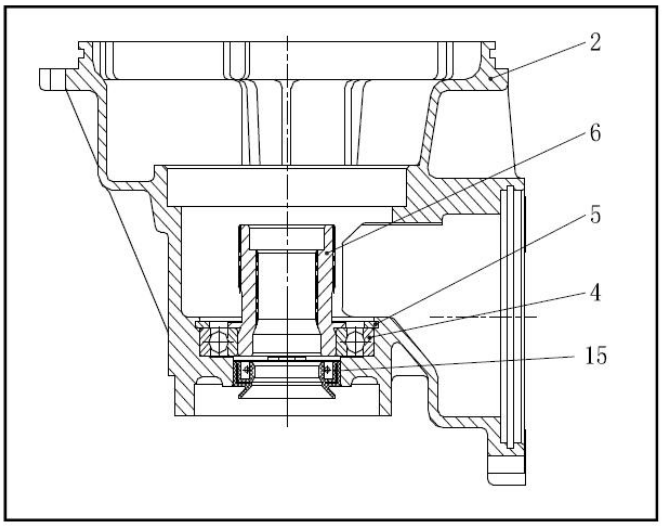
Item“24”tightening torque62Nm



Note: Use engine oil for oil seal, bearing and drive clutch assembly;

“ 24” Use screw thread fastening glue;

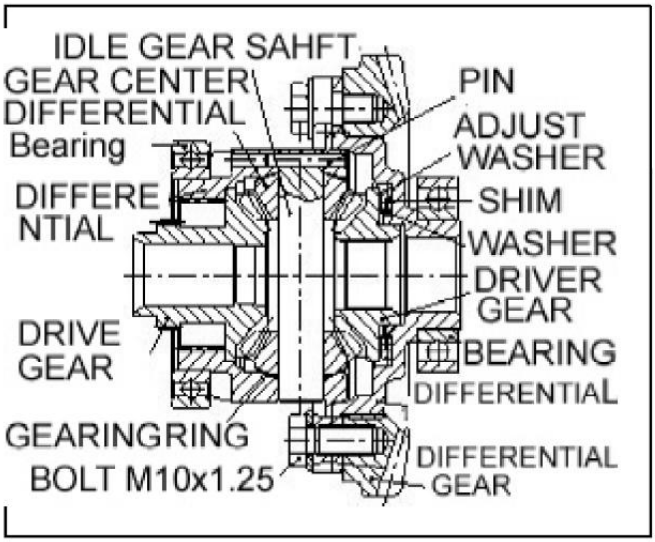
● Front differential gear case cover assembly;



Note: Use engine oil for oil seal or bearing assembly.

● Differential gear assembly

M10×1.25×22,Tightening torque45Nm



Note ： Use engine for bearing and differential gear;;

Use proper washer to make gear working freely.

Adjust washer thickness	0.1	0.2	0.3	0.4	0.5	1.0

● **Front axle assembly and adjustment**

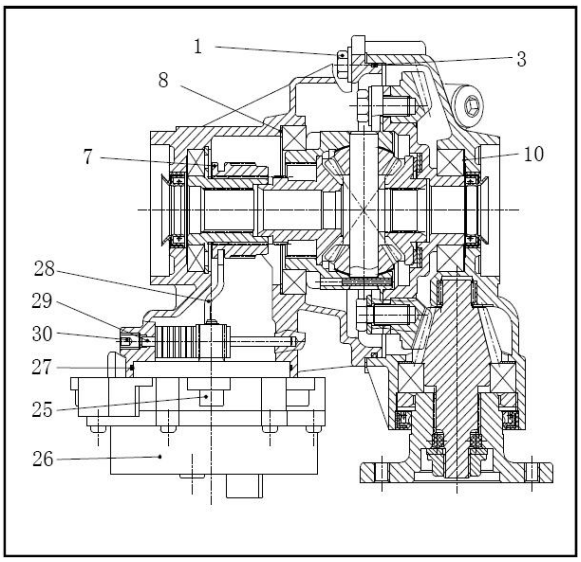


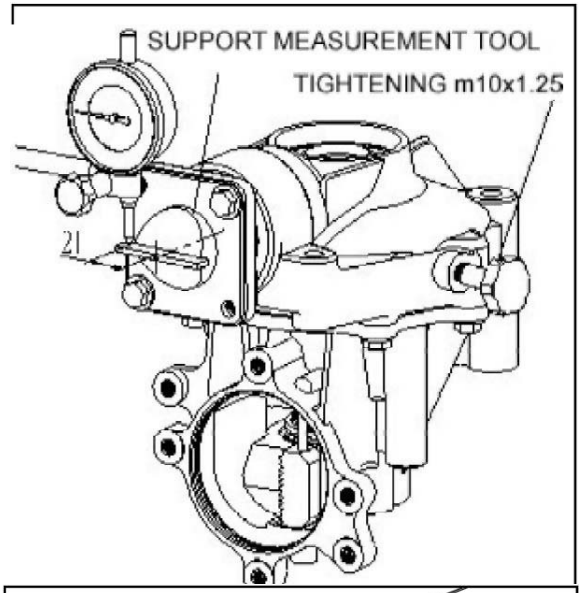
Illustration:

Tightening torque	
Item“ 1”	25Nm
Item“25”	13Nm
Item“30”	13Nm
Bolt	25Nm
Bolt	25Nm

Use fastening glue for item“30” assembly.

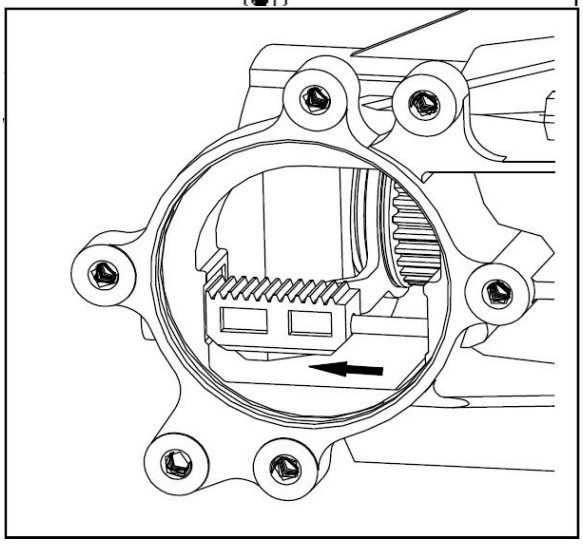
a. Use proper washer 8 and 10 thick ness to adjust gear side clearance between drive pinion gear and differential gear.

Drive bevel gear clearance measurement; Install support tools, tightening bolts(M10 ×1.25 ×60) put up dial indicator, make sure 21 mm is between measuring point and support tools. Turn support tools counter-clock and read the data.



Standard: 0.10-0.25

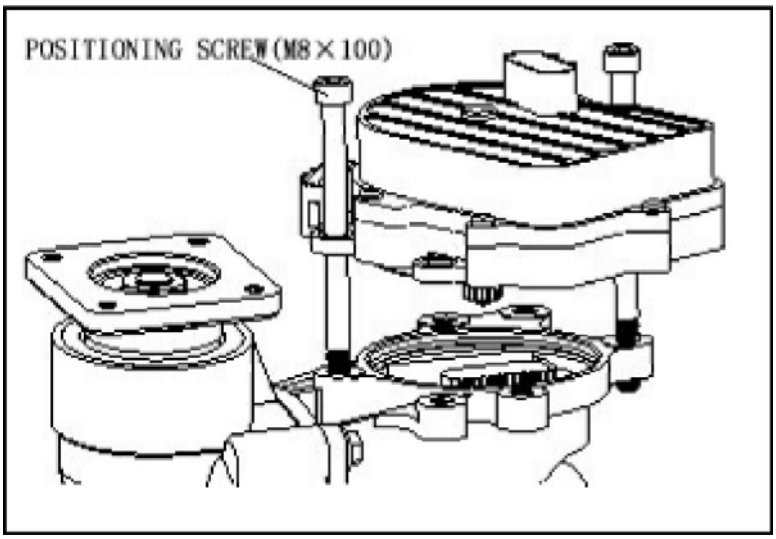
Adjust washer thickness	0.1 0.2 0.3 0.4 0.5 1.0



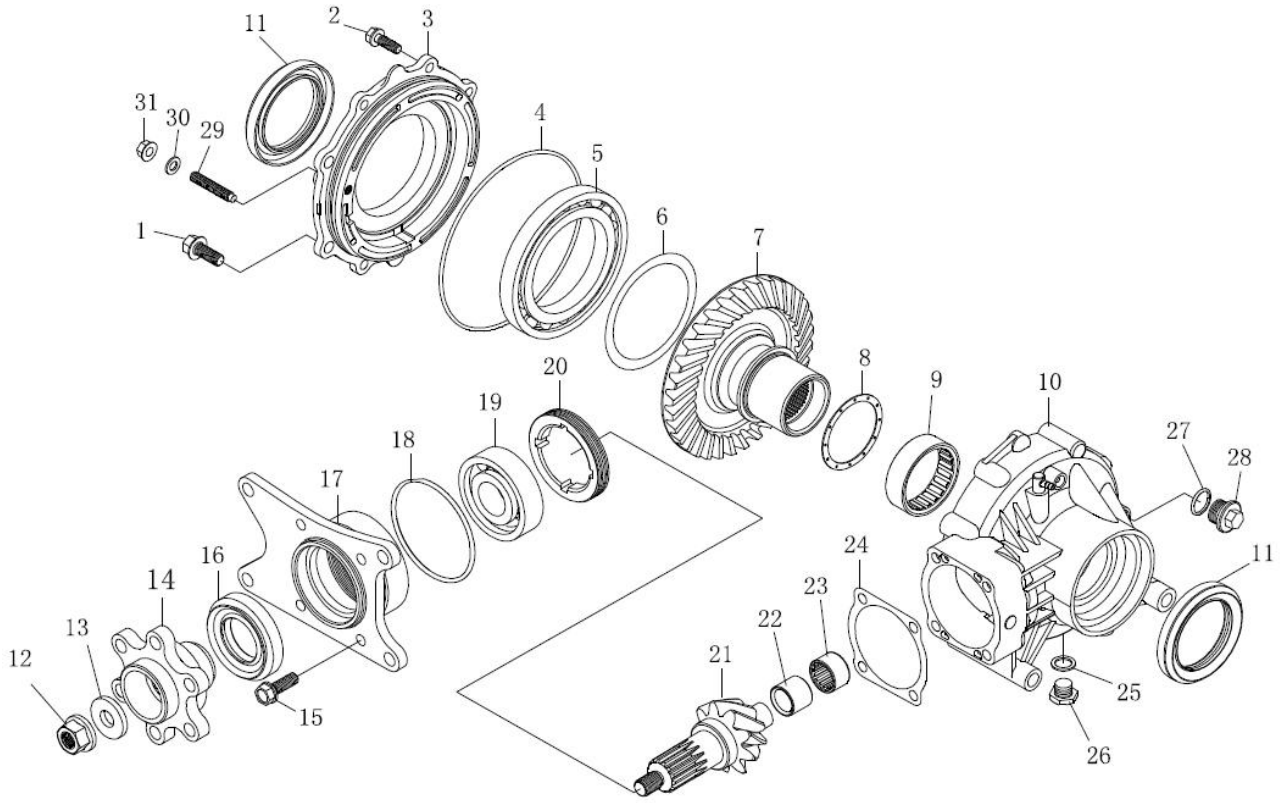
b. Shift fork and drive clutch assembly should be against tightly to the arrow shape illustration.

c. Use special equipment or vehicle control circuit into two stroke position before gear motor assembly;

d. Make sure b and c is assembled using illustrated positioning bolt before gear motor and front axle.



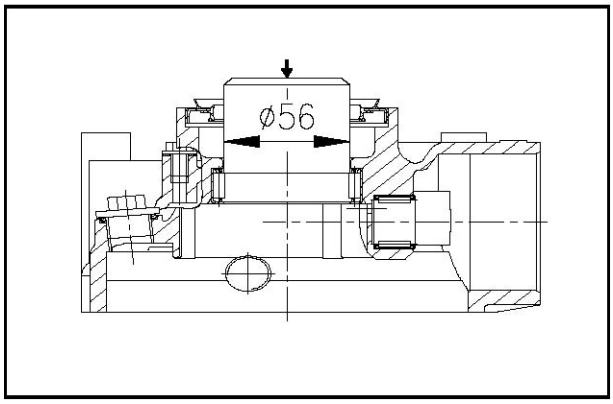
Disassembly of rear axle



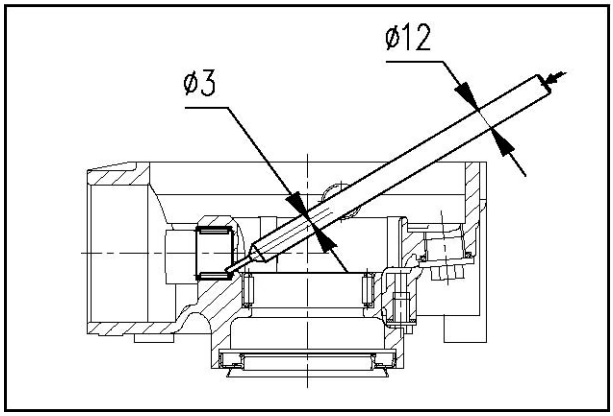
Ref.No	Description	QTY	Ref.No	Description	QTY
1	Bolt M10× 1.25× 25	2	17	Bevel gear bearing hous.	1
2	Bolt M8× 25	4	18	O-ring 64.5× 3	1
3	Rear gear case cover(R)	1	19	Bearing 6305	1
4	O-Ring 151× 3	1	20	Bearing retainer	1
5	Bearing 16017/C2	1	21	Drive bevel gear	1
6	Adjust washer（2）	1 ~ 2	22	Inner race NA5903	1
7	Ring gear, rear axle	1	23	Outer race NA5903	1
8	Adjust washer（1）	1	24	Adjust gasket	1 ~ 3
9	Needle bearing55BTM6720A	1	25	Washer 14.5× 21× 1.5	1
10	Rear gear case	1	26	Bolt M14× 1.25× 12	1
11	Oil sealSD4 65× 90× 9 NS	2	27	O-ring 19× 2.5	1
12	Nut M12× 1.25	1	28	Bolt M20× 1.5× 12	1
13	Washer12.5× 30× 4	1	29	HE× Screw M8×45	1
14	Coupler, rear axle	1	30	Washer 8.2× 15× 1.5	1
15	BoltM8× 35	4	31	Screw M8	1
16	Oil seal 35× 61× 9.5(14)	1			

Needle bearing removal

a. Disassemble needle bearing 55BTM6720 as illustration if necessary.



b. Disassemble needle bearing NA5903 as illustration after heating upto 150℃.



Rear axle inspection after disassembly

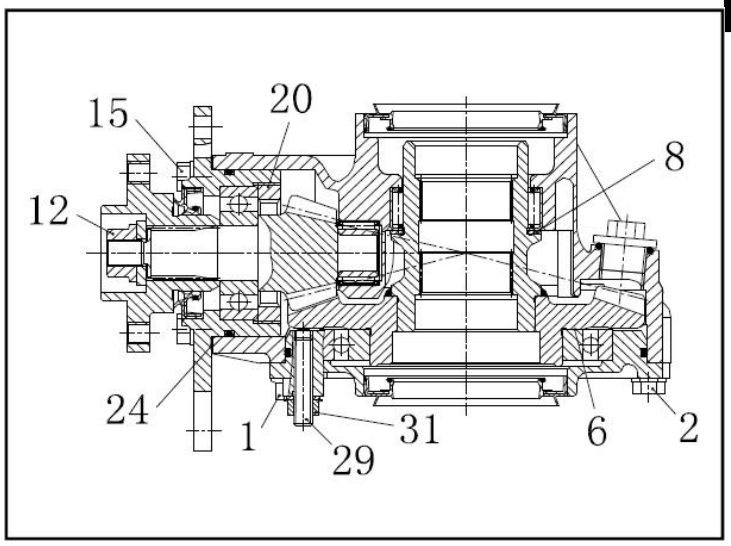
- Check if there is crack or damage in rear gear case, see mounting hole is ok . Replace gear case or right cover if necessary;
- Check if bearing clearance is normal, and turing stability, rollway, stell ball, neddle bearing as well. Replace bearing if necessary.(Special tools are required)
- Check rear axle if bearing clearance is normal, turing status rollway, stellball, neddle bearing as well. Replace bearing if necessary.(Special tools are required)
- Check worn status of drive bevel gear and ring gear rear axle. Replace if necessary;
- Check oil seal lips, o-ring shape. Replace parts if necessary;
- Check cylndrical surface of rear axle and oil seal lips. Replace if necessary;
- Check inner and outsider spline. Replace if necessary;
- Check other parts. Replace if necessary.

Rear axle assembly and adjustment

● Illustration

Tightening torque	
Item“ 1”	40Nm
Item“ 2”	25Nm
Item“ 12”	70Nm
Item“ 15”	25Nm
Item“ 20”	70Nm
Item“ 31”	16Nm
Bolt	25Nm
Bolt	25Nm

Use glue for Item“29”assembly



● Assembly clearance and adjustment of drive bevel gear assembly rear axle.

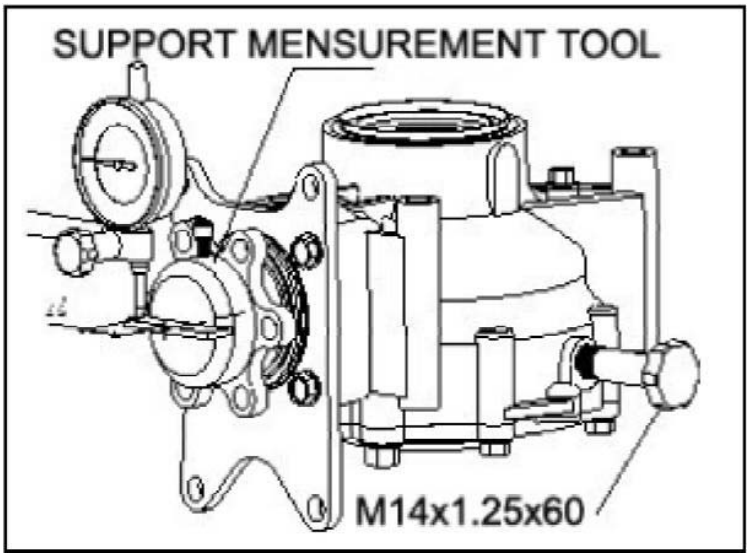
a. Adjust installing by“24” thickness

b. Adjust gear clearance by choosing “ 6” thickness.

c. Inspect installing clearance by checking bevel gear clearance.

Standard: 0.1 ~ 0.2

e Keep installing point bearing clearance 0.1 ~ 0.2 by choosing“8” thickness.



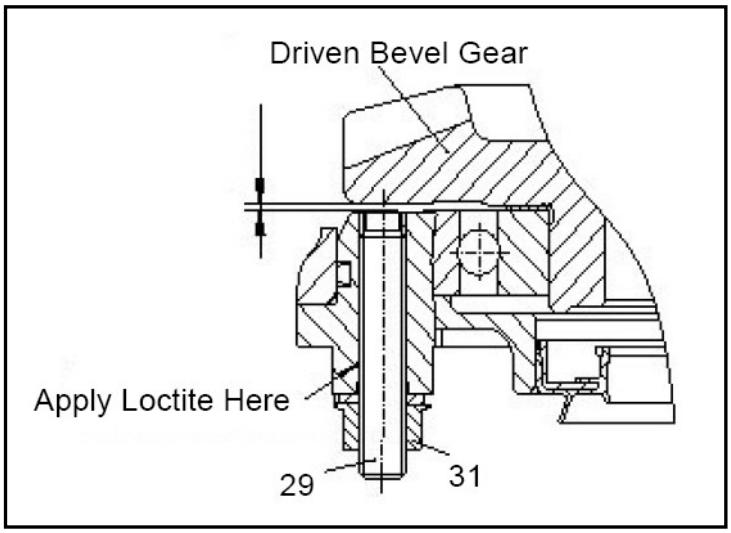
Adjust “6” thickness	0.2 0.3 0.4

Adjust “8” thickness	1.0 1.2 1.4 1.6 1.8

Adjust washer “24”thickness	0.4 0.5 0.6

d. Drive bevel gear clearance measure ment illustration(see above).Install measuring tools,tightening torque(M14 ×1.25×60).Put up dial indicator and make sure distance from indicator point tomeasuringtoolcenteris22mm.Counter-clock turn the toll and read the data.

f. Adjust item 29 as illustrated, and make sure its end and back clearance of drive gear is 0.3 ~ 0.6. Tighten item 31.



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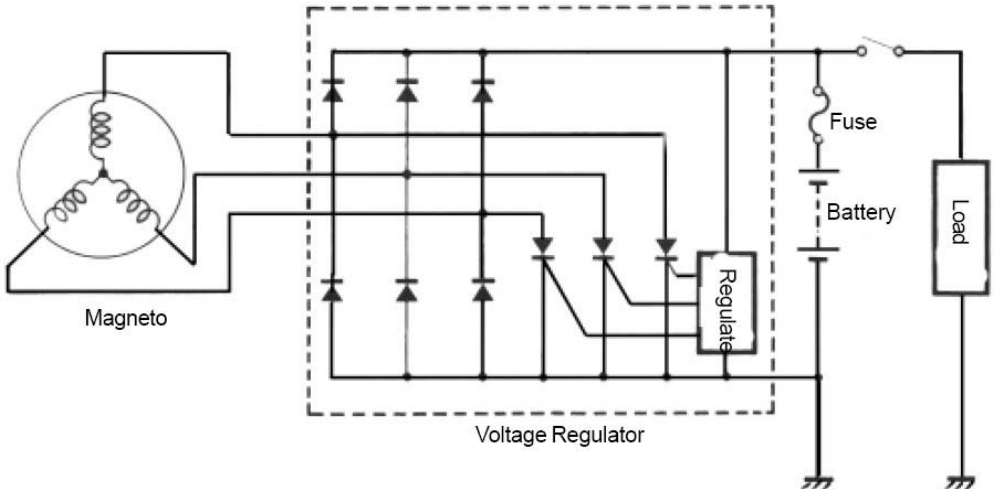
△ CHARGING SYSTEM

CHARGING CIRCUIT DIAGRAM



MAGNETO COIL RESISTANCE

● MEASURE TRIPHASE MAGNETOR STATOR COIL RESISTANCE

● IF THE RESISTANCE VALUE OUT OF PRE-SCRIBED VALUE, REPLACE THE STATOR COIL.

● INSPECT IF THE STATOR COIL AND STATOR CORE INSULATION.

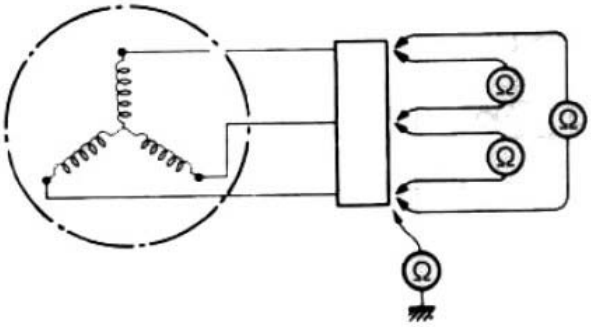
TURN **MULTIMETER** TO：**1×10Ω**

MAGNETO COIL RESISTANCE: **0.5-1.5Ω**

（**YEL LOW-YELLOW**）

INSULATING RESISTANCE: ∞ Ω

（**YELLOWGROUND**）



MAGNETOR NON-LOADED PER FORMANCE

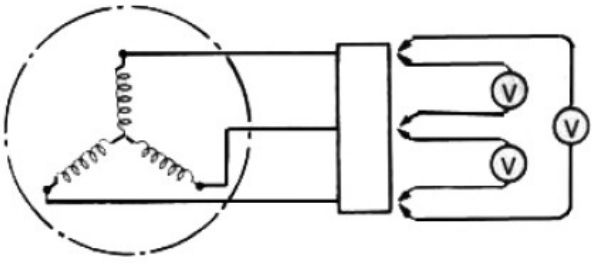
● START THE ENGINE LET IT GOES TO 5000Rpm USE MULTIMETER MEASURE MAGNETO STATOR COIL THREE OUTPUT LINE VOLTAGE.

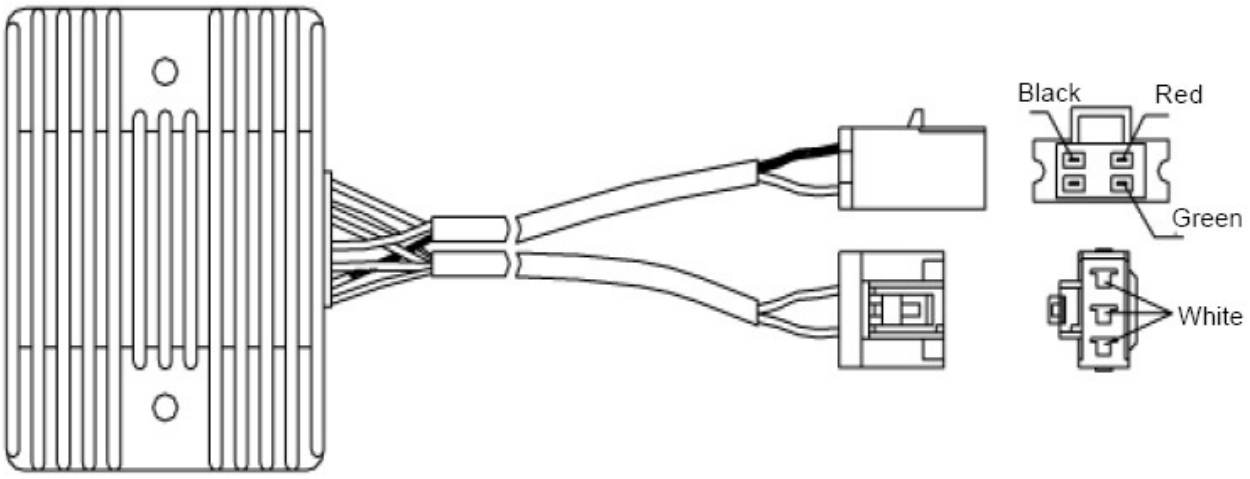
● IT THE RESULT VALUE BELLOW THE SETTING VALUE, CHANGE A NEW MAGNETO.

ADJUST MULTIMETER TO ALTERNATING VOLT AGE GRADE

MAGNETOR NON-LOADED STATE COIL VOLT AGE VALUE:

5000Rpm＞200V(ALTERNATING CURRENT)





- USE MULTIMETER MEASURE THE RESISTANCE BE TWEEN THE TERMINALS, AS BELOW FORM SHOWS, IF THERE IS ONE DATA OUT OF THE SETTING VALUE, REPLACE WITH A NEW ONE.
- AFTER ENGINE RUNNING, BATTERY FULL POWER,IF VOLTAGE BETWEEN RED LINE, GREEN LINE EXCEED 15V OR UNDER 12V, REPLACE WITH A NEW ONE.

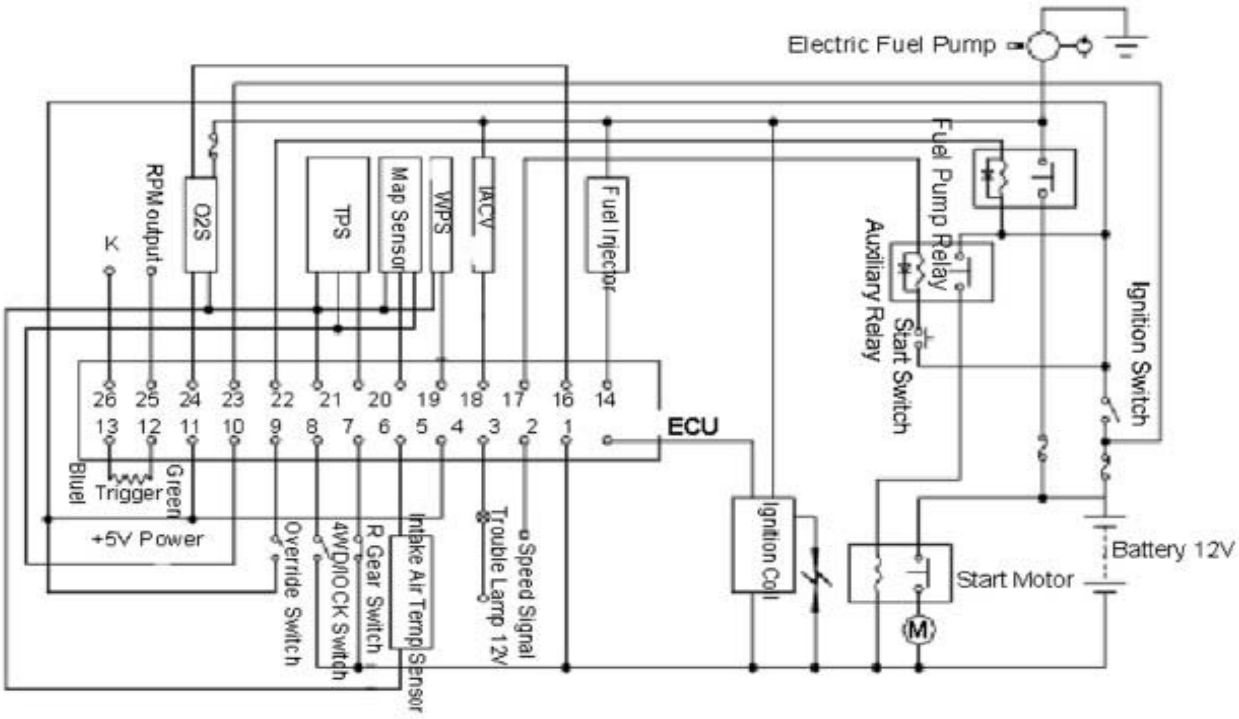
ADJUST MULTIMETER TO DIODE

ATTENTION:
WHEN MULTIMETER PROBE UNCONNECTED,IF THE MULTIMETER SHOWS BELLOW 1.4V, THEN REPLACE IT'S BATTERY.

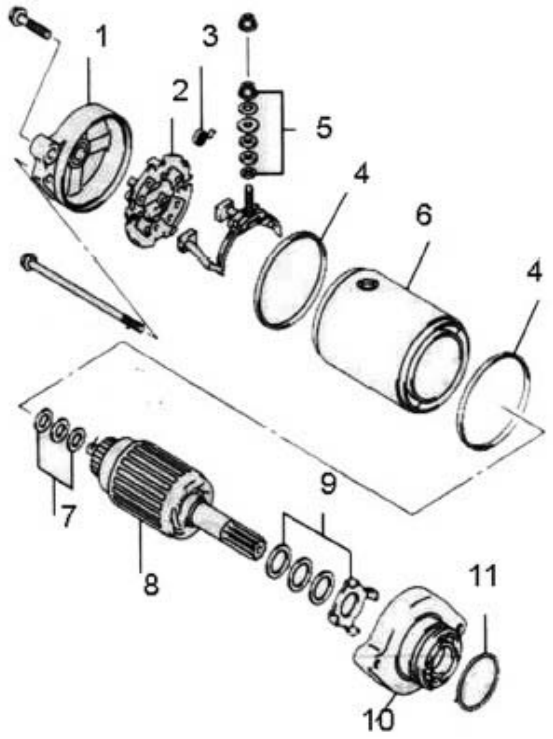
		Red ⊕					
		Yellow	Yellow	Yellow	Green	Red	Black
Black ⊖	Yellow		∞	∞	400-500	∞	∞
	Yellow	∞		∞	400-500	∞	∞
	Yellow	∞	∞		400-500	∞	∞
	Green	∞	∞	∞		∞	∞
	Red	400-500	400-500	400-500	750-800		∞
	Black	∞	∞	∞	∞	∞	

△ STARTING SYSTEM

TRIGGER CIRCUIT DIAGRAM



STARTING MOTOR



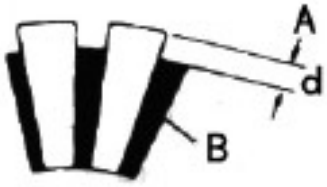
1. End Cover
2. Brusher Holder
3. Brush Spring
4. O-ring
5. Brush Terminal
6. Stating Motor Cylinder
7. Washer
8. Armature
9. Washer
10. Inner Cover
11. O-ring

ELECTRIC BRUSH

- CHECK IF THE ELECTRIC BRUSH PERMANENT SEAT ABNORMAL, CRACK, UNSMOOTH.
- IF THERE IS ANY BROKEN, CHANGE THE WHOLE ELECTRIC BRUSH ASSEMBLY

COMMUTATOR

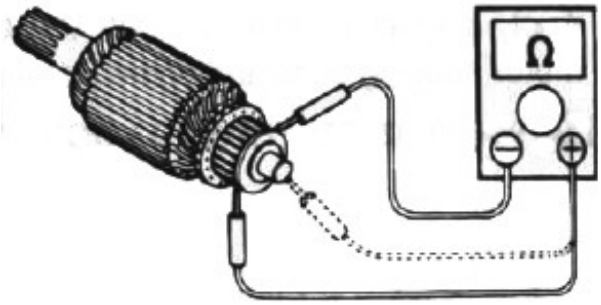
- CHECK IF THE COMMUTATOR CHANGE COLOR, ABNORMAL DAMAGE OR OVER WEAR.
- IF THERE IS WEAR OR DISCOLORATION, REPLACE WITH A NEW AMATURE.
- IF THE COMMUTATOR SURFACE DISCOLOURATION, POLISH WITH SEND PAPER AND WIPE UP WITH DRY CLOTH.
- IF OVER WEAR, CUT PART OF B INSULATOR WITH BLADE,KAME THE DISTANCE BETWEEN A AND B TO d.



$d \geqslant 1.5mm$

ARMATURE COIL

USE MULTIMETER CHECKING IF IT IS INTERCOMMUNICATION.
BETWEEN THE TERMINALS, BETWEEN TERMINALS
AND ARMATURES. IF THEY NOT COMMUNICATION, REPLACE WITH A NEW ARMATURE.

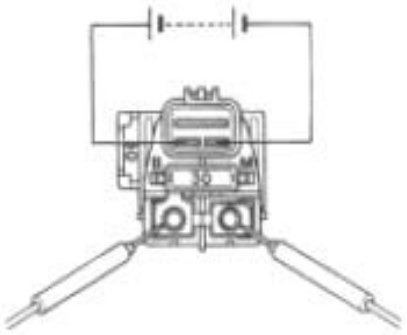


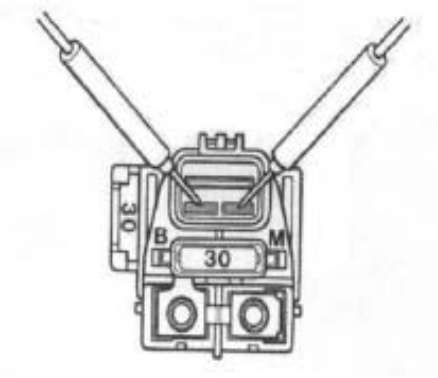
OIL SEAL

CHECKING IF OIL SEAL LIP DESTROY OR OIL LEAK. IF THERE IS ANY DESTROY OR LEAKAGE, REPLACE WITH A NEW STARTING DYNAMO.

INITIATING RELAY

- PUT 12V TO THE SMALL TERMINALS;THERE IS CONTINUITY BETWEEN THE LARGE TERMINALS.
- IF THE START RELAY CONTACTS,SHOULD MAKE A CLICKING SOUND.
- WHEN POWER IS TAKEN AWAY FROM THE SMALL TERMINALS,THERE SHOULD BE NO CONTINUITY BETWEEN LARGE TERMINALS.
- IF BOTH ABOVE TWO ITEMS ARE OK,IT INDICATES THE RELAY IS OKAY.
  ADJUST MULTIMETER TO DIODE GRADE.





WARNING:
RELAY VOLTAGE LOADED CANNOT EXCEED 2MINS,
OR ELSE,IT WILL CAUSE THE RELAY OVERHEAT

- USE MULTIMETER MEASURING STARTING RELAY COIL RESISTANCE,IF THE VALUE OUT OF THE SETTING RANGE, REPLACE WITH A NEW ONE.

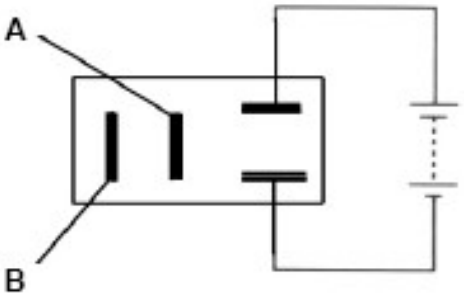
- **ADJUST MULTIMETER TO 1X10Ω**

START AUXILIARY RELAY COILRESISTANCE:

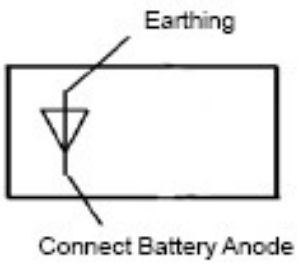
3-5Ω

START AUXILIARY RELAY, FULE PUMP RELAY

- APPLY 12VOLTS TO THE TWO TERMINALS.USE MULTIMETER MEASURE IF CONTACTS A,B IS MEET.
  ADJUST MULTIMETER TO DIODE GRADE.
- IF THE STARTING RELAY CLICKS .
- WHEN NON-LOADED 12V VOLTAGE,THE TWO CONTACTS UNCONNECTED.
- EITHER OF THE ABOVE TWO ITEMS IS SHOWS THE RELAY IS FINE.
- ADJUST MULTIMETER TO **1X100** MEASURING THE COIL RESISTANCE.



AUXILIARY RELAY COIL RESISTANCE: 90-100Ω



ATTENTION:
AT THE BACK OF AUXILIARY RELAY,PARALLEL TO THE DIODE DIRECTION, IT IS THE RELAY COIL'S ANODE.

STARTING ENGINE NOTICE

● JOINT LINES ACCORDING TO TRIGGER CIRCUIT

● BEFORE STARTING, CHECK IF ALL THE PARTS ARE CORRECT JOINTED.ELECTRICITY SPRAYING JOINT SEE BELOW:

● CHECK IF GAS CIRCUIT NORMAL.

● CHECK IF OIL CHANNEL AT FAULT.

IF BLOCKED,CLEAR BLOCKED PART, SECURE FUEL CHANNEL SMOOTH.

IF LEAKAGE,RELINK LEAK SECTION, SECURE THE FUEL CHANNEL NO LEAKAGE.

Fuel Pressure Gauge

● USE FUEL PRESSURE GAUGE TO MEASURE FUEL PRESSURE.

FULE PUMP OUTPUT PORT PRESSURE: 0.3±0.01Bar

.

● CHANGE ENGINE SHIFT HAND LEVER TO NEUTRAL.

● USE DIAGNOSTIC EQUIPMENT CHECK IF AT FAULT, IF YES, CLEARING OF FAULT ACCORDING TO DIAGNOSTIC TROUBLE CODE.

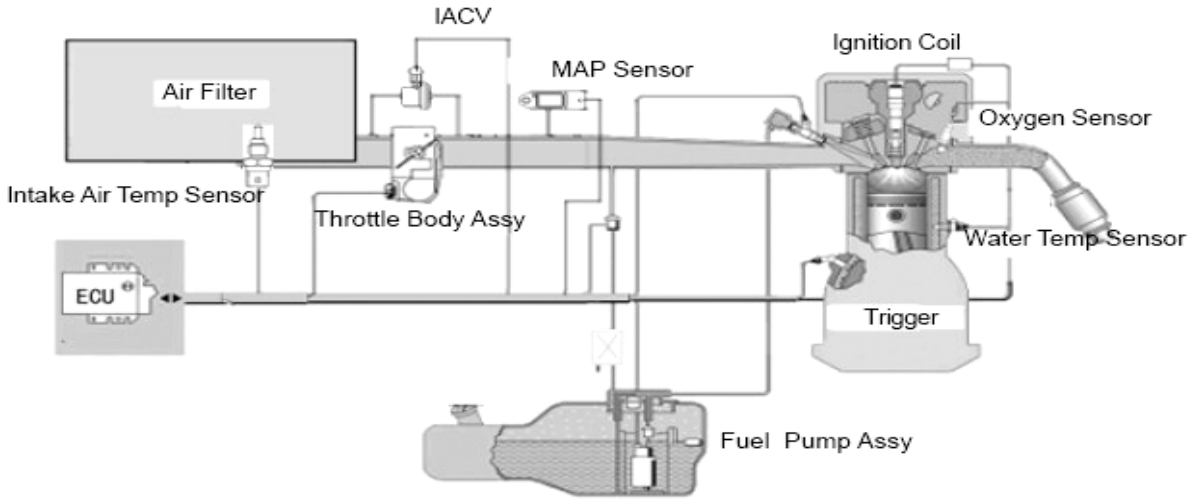
.

● CLOSE THROTTLE,TURN OFF THE IGNITION SWITCH,PRESS START SWITCH 3-5 SECONDS:

● START THE ENGINE, WARM UP TO IDLE SPEED STABLE,EXAMINE IDLING SPEED:

IDLING SPEED:1400±100rpm.

△ELECTRONIC FUEL INJECTION SYSTEM



ENGINE ELECTRONIC FUEL INJECTION SYSTEM INCLUDING THREE PARTS:

(1)SENSOR:

TRANSFORM THE ENGINE NON-ELECTRICITY PHYSICAL QUANTITY TO ELECTRICITY QUANTITY, AND PROVIDE ALL THE INFORMATIONS TO THE ELECTRONIC CONTROL UNIT.IT IS THE ELECTRONIC CONTROL'S SPY. INCLUDING THE FOLLOWING SENSORS:

● **INLET PRESSURE SENSOR** (LOADING INFORMATION).

● INLET **AIR TEMPERATURE SENSOR** (AIR DENSITY INFORMATION).

● THROTTLE **POSITION SENSOR** (LOADING INFORMATION¡¢LOADING RANGE INFORMATION, CCELERATION AND DECELERATION INFORMATION).

● TRIGGER (BENT AXLE PHASE POSITION INFORMATION).

● **WATER TEMPERATURE SENSOR** (ENGINE TEMPERATURE INFORMATION).
ODOMETER **SENSOR** (OUTPUT SHAFT SPEED INFORMATION).

● GEAR SENSOR GEAR INFORMATION) **(INCLUDING GEAR SENSOR AND REVERSE GEAR SENSOR)**

● OXYGEN SENSOR(EXCESS AIR COEFFICIENT ABOVE 1 OR LOWER THAN 1

● FOUR **WHEEL DEAD LOCK** (4WD DEAD LOCK INFORMATION).

● **ASSISTOR SWITCH** (RELIEF SPEED LIMIT INFORMATION).

(2) ECU:

ELECTRONIC CONTROL UNIT, IT IS THE BRAIN OF THE ENGINE MANAGEMENT SYSTEM.IT ANALYZE AND PROCESS KINDS OF INFORMATIONS PROVIDE BY THE SENSORS, REACH A CONCLUSION, AND THEN TRANSMIT
THE CONCLUTION TO THE ACTUATOR, SO AS TO ENSURE THE ENGINE OPERATION UNDER OPTIMAL STATE.

(3)ACTUATOR:

EXECUTE THE ECU INSTRUCTION. THE ACTUATOR IS THE HAND OF ECU, THE MAIN ACTUATORS ARE.

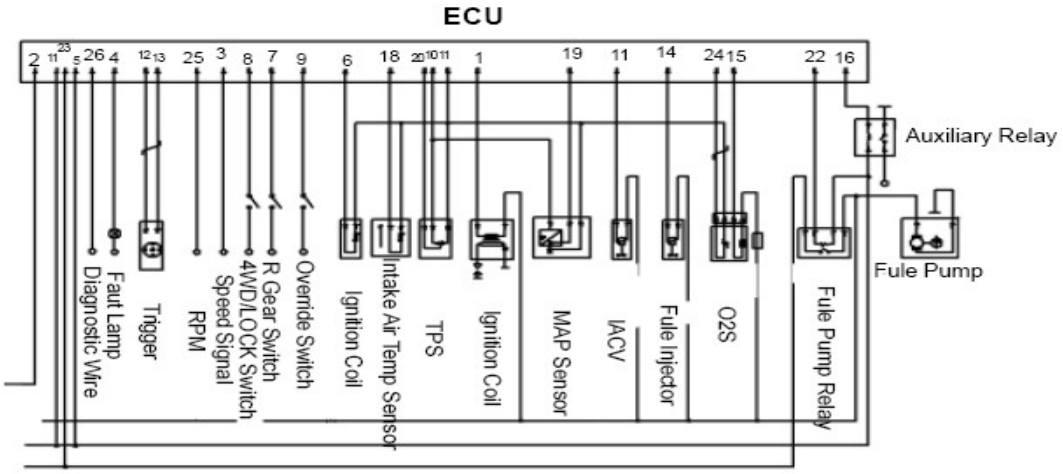
● FUEL PUMP ASSY (SUPPLY HIGH PRESSURE FUEL).

● FUEL INJECTOR(INJECTQUOTAL FUEL,MAKE FUEL SPRAY EXCELLENT).

● IGNITION COIL (PROVIDE HIGH PRESSURE IGNITION ENERGY TO SPARK PLUG).

● IDLE SPEED CONTROL VALVE (PROVIDE IDLE SPEED AIR INPUT).

ELECTRONIC FUEL INJECTION SYSTEM DIAGRAM



ELECTRONIC FUEL INJECTION SYSTEM MAINTENANCE NOTICE

● USE QUALITY COMPONENTS FOR SERVICE, OR ELSE IT CANNOT GUARANTEE THE ELECTRONIC FUEL INJECTION NORMAL OPERATION.

● IN THE COURSE OF MAINTENANCE, NEVER TRY TO BREAK DOWN THE ELECTRONIC PARTS.

● IN THE COURSE OF MAINTENANCE, THE ELECTRONIC COMPONENTS MUST BE HANDLED CAREFULLY.

● WHEN CUT DOWN OR CONNECT UP PLUG CONNECTOR,YOU MUST TURN OFF THE IGNITION SWITCH, OR ELSE THE ELECTRONIC FUEL INJECTION COMPONENTS WILL BE DAMAGED.

● WHEN TAKE DOWN THE ELECTRIC FUEL PUMP, DONOT ENERGIZE THE FUEL PUMP, IT CAN GENERATE SPARK AND CAUSE FIRE.

● FUEL PUMP NOT PERMITTED DO OPERATION TEST UNDER DRY STATE OR IN WATER.OR ELSE WILL SHORTEN IT'S LIFE. BESIDES,THE OIL FUEL PUMP TWO EXTREMES CANNOT REVERSE CONNECTION.

● ELECTRONIC FUEL INJECTION SYSTEM FUEL SUPPLY PRESSURE IS HIGH(AROUND 300kPa),THE FUEL PIPE ALL APPLY HIGH PRESSURE RESISTANCE PIPE,SO DO NOT DISMANTLE THE PIPE WHEN THE FUEL SYSTEM NEEDED TO BE REPAIRED,YOU HAVE TO DO FUEL PIPE PRESSURE RELIEF BEFORE DISMANTLE THE OIL PIPE.PRESSURE RELIEF METHOD IS AS FOLLOWING:

REMOVE FUEL PUMP RELAY,STARTING THE ENGINE AND LET IT IDLE , UNTILL THE ENGINE DIES ITSELF.

FUEL PIPE'S DISMANTLE AND FUEL FILTER'S REPLACEMENT SHOULD BE CARRY ON BY PROFESSIONAL PERSON IN WELLVENTILATED PLACE.

● WHEN INSPECTING THE IGNITION SYSTEM,ONLY IF NECESSARY,DO SPARK TEST,AND SHOULD BE AS FAST AS POSSIBLE, DONOT OPEN AIR SAMPER WHEN TESTING, OR ELSE PLENTY OF UNBURNED FUEL WILL ENTER THE VENT-PIPE AND DAMAGE THE TRIPLET CATALYST.

● IDLE SPEED REGULATION COMPLETELY CARRY OUT BY ELECTRONIC FUEL INJECTION SYSTEM,THROTTLE VALVE GUN LIMIT SCREW ALREADY SETTED WHEN IT LEAVE THE FACTORY,IT INITIAL POSITION CANNOT BE CHANGED EASILY.

● WHEN INSTALLING THE BATTERY, THE POSITIVE AND THE GROUND CANNOT BE INSTALLED WRONG. THIS SYSTEM APPLYS NEGATIVE GROUND.

● WHEN ENGINE RUNNING,DON'T UNHOOK THE BATTERY CABLE.

● BEFORE CARRY OUT ELECTRONIC WELDING ON THE VEHICLE,YOU ARE REQUIRED TO UNHOOK THE BATTERY POSITIVE TERMINAL, NEGTIVE TERMINAL AND ECU.

● DONOT USE METHOD IMPALE LEAD CUTICULAR TO TEST COMPONENTS'S INPUT AND OUTPUT ELECTRICAL SIGNAL.

● SET UP ENVIRONMENTAL PROTECTION CONSCIOUSNESS. TREATING THE WASTE AFTER MAINTENANCE.

SERVICE TOOLS

TOOL NAME:DIAGNOSTIC EQUIPMENT

FUNCTION:
READ CLEAR ELECTRONIC FUEL INJECTION SYSTEM TROUBLE CODE,OBSERVE DATA STREAM, COMPONENETS MOTION TESTS.

TOOL NAME: DIGITAL MULTIMETER
FUNCTION:
INSPECT ELECTRONIC FUEL INJECTION SYSTEM VOLTAGE, CURRENT, RESISTANCE ETC.

TOOL NAME: VACUUM METER
FUNCTION:

INSPECT INLET PIPE PRESSURE STATE.

TOOL NAME: ELECTRONIC IGNITION TIMING

FUNCTION:
INSPECT ENGINE ELECTRONIC SPARK TIMING.

TOOL NAME: CYLINDER PRESSURE GAUGE

FUNCTION:
CHECK CYLINDER COMPRESSION.

TOOL NAME: FUEL PRESSURE GAUGE

FUNCTION:
INSPECT FUEL SYSTEM PRESSURE STATE,JUDGE THE FUEL SYSTEM FUEL PUMP AND FUEL PRESSURE REGULATING VALVE WORK STATE.

ELECTRONIC FUEL INJECTION PARTS

STRUCTURE AND FUNCTION

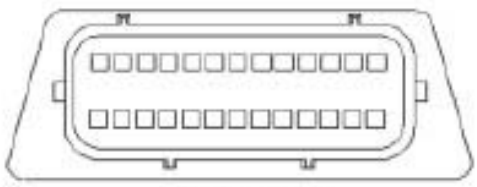
(1) ECU:

ECU,IT IS THE BRAIN OF THE ENTIRE ELECTRONIC FUEL INJECTION SYSTEM. IT ANALYZE AND PROCESS THE INFORMATIONS PROVIDED BY THE SENSOR, REACH A CONCLUSION, THEN TRANSMIT THE CONCLUSION TO THE ACTUATOR AS INSTRUCTION,SO AS TO MAKE THE ENGINE OPERATION IN OPTIMAL STATE.

ECU

ECU EACH STITCH FUNCTION:

1.IGNITION COIL CONTROL SIGNAL
2.GROUND
3.VEHICLE SPEED SIGNAL
4.TROUBLE LAMP
5.IGNITION SWITCH POWER+
6.INTAKE AIR TEMPERATURE SENSOR SIGNAL
7.REVERSE GEAR
8.4WD DEAD LOCK SWITCH SIGNAL
9.ASSISTOR SWITCH SIGNAL
10.+5VPOWER OUTPUT
11.IGNITION SWITCH POWER+
12.TRIGGER SIGNALA
13.TRIGGER SIGNALB
14.OIL ATOMIZER
15.OXYGEN SENSOR HEATING
16.SUPPLEMENTARY RELAY
17.IDLE SPEED CONTROL VALVE(CARBON TANK CONTROLVALVE)
18.WATER TEMPERATURE SENSOR SIGNAL
19.INLET PRESSURE SENSOR SIGNAL
20.AIR DAMPER POSITION SENSOR SIGNAL
21.SENSOR
22.OIL PUMP
23.BATTERY POWER+
24.OXYGEN SENSOR
25.ENGINE SPEED OUTPUT



ECU Connector

LIMIT DATA:

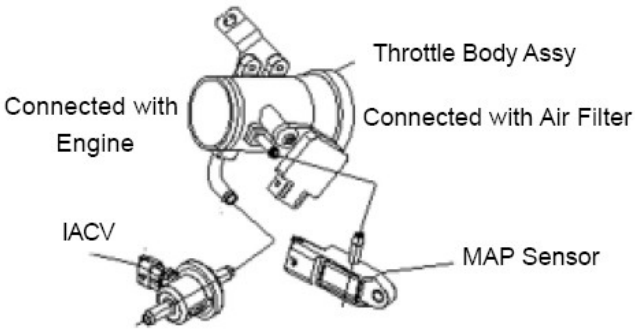
Quantity		Value			Unit
		MIN	Typical	MAX	
Battery Voltage	Nommal Operation	9.0	14.0 ± 1	16.0	V
	Limited Function	6.0-9.0		16.0-18.0	V
Withstanded Overvoltage and Time	26.0V	Limited Function Such As Diagnosis		5.0	Min
Working Temp		-40		+70	℃
Storage Temp		-40		+90	℃

● DISALLOW TO ADD LOAD ON CRUST OR COVER BOARD.

● HANDLED CAREFULLY AND AVOID TO DROP ON THE FLOOR.

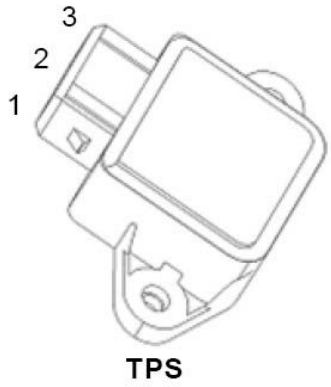
(2)THROTTLE VALVE ASSY:

JOIN THE AIR CLEANER AND ENGINE, CONTROL THROTTLE VALVE OFF AND ON ANGLE THROUGH THROTTLE CABLE. AIR DAMPER POSITION SNESORTRANSMIT ANGLE SIGNAL TO ECU.

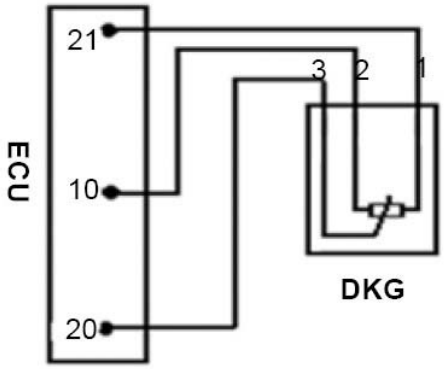


EACH PIN FUNTION:

1. CONNECT 5V POWER
2. GROUNDING
3. OUTPUT VOLTAGE SIGNAL



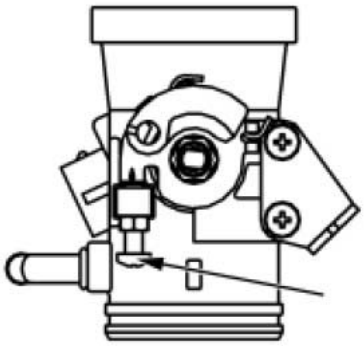
THE RIGHT DRAWING IS THE WIRING DIAGRAM WITH ECU



TPS Wiring Diagram

IDLE SPEED LIMIT SCREW NOT ALLOWED TO BE ADJUSTMENT.

ENGINE IDLE SPEED COMPLETELY DEPEND UPON ELECTRONIC SPRAYING SYSTEM ADJUSTMENT. DO NOT ADJUST THE IDLE SPEED SCREW.

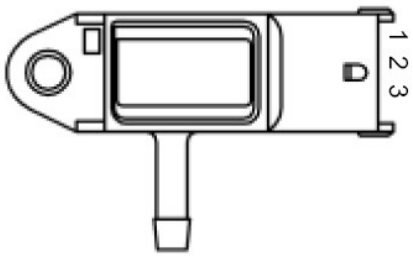


Idle Speed Ajuster

(3)MAP Sensor:
MONITOR AIR PRESSURE IN MANIFOLD,PROVIDE ENGINE LOAD INFORMATION TO ECU.
EACH STITCH FUNCTION:
1.CONNECT 5V POWER

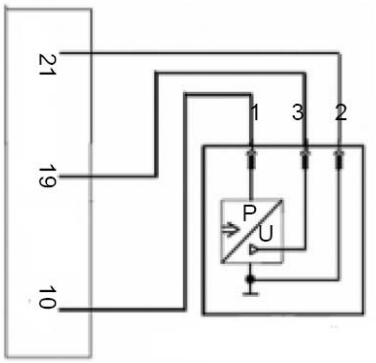
2.GROUNDING

3.OUTPUT VOLTAGE SIGNAL



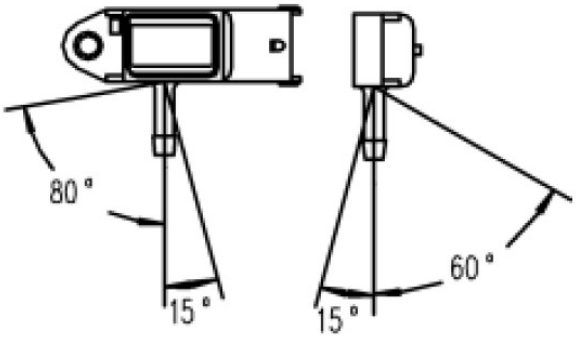
MAP Sensor

THE RIGHT DRAWING IS THE CONNECTION DRAWING FOR SENSOR&ECU.



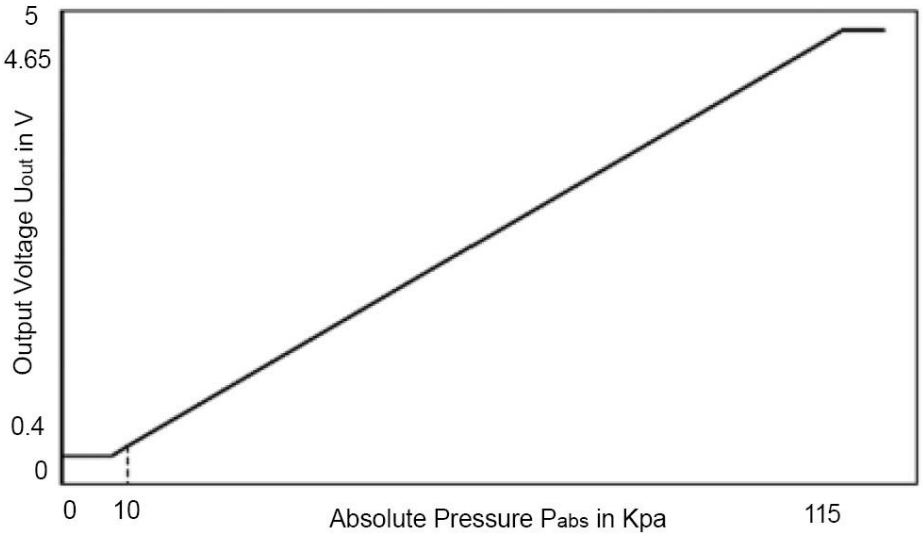
MAP Sensor Wiring Diagram

THE RIGHT DRAWING IS THE PERMIT FITTING LIMIT, IN THIS WAY CAN ENSURE THERE IS NO CONDENSED WATER INSIDE THE SENSOR,THE CONDENSED WATER CAN DESTROY SENSOR INNER PRESSURE-SENSING DEVICE.



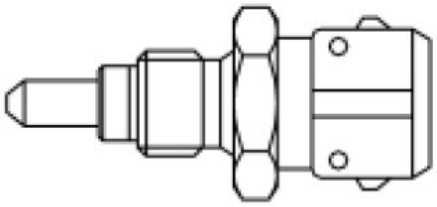
Allowed Range of Setting Angle

THE PICTURE BELOW IS THE RECIPROCAL DIAGRAM DRAWING FOR PRESSURE AND OUTPUT VOLTAGE.
MONITOR PRESSURE RANGE: 10-115kPa.



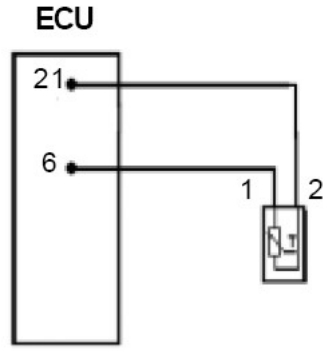
(4)INTAKE AIR TEMPERATURE SENSOR(IAT Sensor):

THIS SENSOR IS A NEGTIVE TEMPERATURE COEFFICIENT (NTC) THERMISTANCE, IT'S RESISTANCE VALUE DECREASE WHEN THE COOLANT TEMPERATURE INCREASE, BUT IT IS NOT LINEAR RELATION.THE SENSOR HAVE 2 PINS, AND THEY CAN BE EXCHANGED USING.



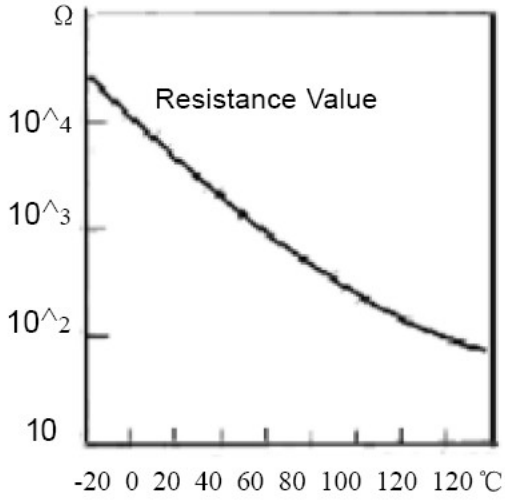
IAT Sensor

THE RIGHT DRAWING IS THE WIRING DIAGRAM FOR SNESOR&ECU.



IAT Sensor Wiring Diagram

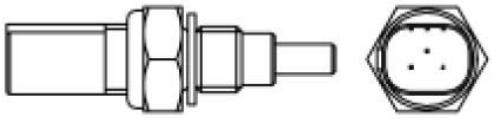
THE RIGHT DRAWING IS FOR SENSOR EMPERATURE RESISTANCE PROPERTY LIST.



(5)WATER TEMPERATURE SENSOR:

THIS SENSOR IS A NEGTIVE TEMPERATURE COEFFICIENT (NTC) THERMISTANCE,IT'S RESISTANCE VALUE DECREASE WHEN THE COOLANT TEMPERATURE INCREASE,BUT IT IS NOT LINEAR RELATION.ONE GROUP PROVIDE TO ECU,MONITOR ENGINE HEAT CONDITION.THE OTHER GROUP PROVIDE TO THE METER,MONITOR WATER TEMPERATURE.

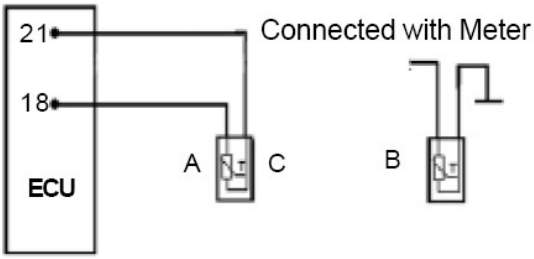
A AND **C IN ONE GROUP, THEY PROVIDE WATER TEMPERATURE TO ECU.**



Water Temp Sensor

B ANDTHREADED PORTION IN ONE GROUP,THEY PROVIDE WATER TEMPERATURE TO THE METER.

THE RIGHT DRAWING IS THE WIRING DRAWING FOR SENSOR,ECU AND METER.



Connected with ECU

THE RIGHT DRAWING IS B END AND CRUST TEMPERATURE PROPERTY LIST, SIGNAL PASS TO THE METER.

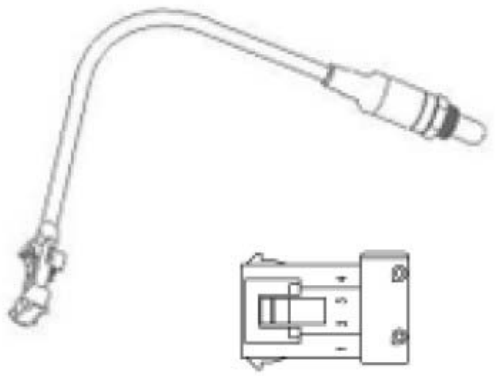
Temp Range (℃)	B to Case End Resistance(Ω)
50 ± 0.2	176-280
80 ± 0.2	63.4-81.4
110 ± 0.2	24.6-30.6

THE RIGHT DRAWING IS END A,C AND THE TEMPERATURE PROPERTY LIST, SIGNAL PASS TO THE ECU.

Temp Range (℃)	A,C to Case End Resistance(Ω)
-20 ± 0.1	13.71-16.94
25 ± 0.1	1.825-2.155
80±0.1	0.303-0.326
110 ± 0.1	0.1383-0.1451

(6)OXYGEN SENSOR:

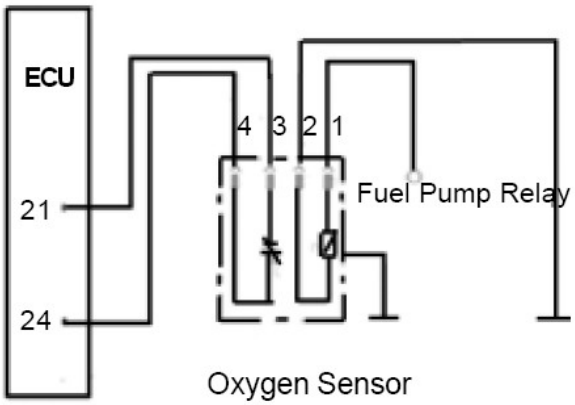
THIS SENSOR USED IN ELECTRONIC CONTROL FUEL INJECTION EQUIPMENT FEEDBACK SYSTEM,TO REALIZE CLOSED-LOOP CONTROL,RAISE ECU CONTROL THE AIR-FUEL DELIVERY RATIO. IT INSTALLED IN THE EXHAUSTPIPE,MEASURING WASTE GAS OXYGEN CONTENT,DEFINITE IF THE GAS AND AIR COMPLETE BURNT,SO AS TO ENSURE UNIT TRIPLET CATALYTIC CONVERTER HAVE MAXIMUM CONVERSION EFFICIENCY TO EXHAUST HC,CO AND NOX.



THE PINS FUNCTION:

1. CONNECT HEATING POSITIVE SOURCE (WHITE).
2. CONNECT HEATING NEGATIVE SOURCE (WHITE).
3. OUTCOMING SIGNAL NEGATIVE POLE (GRAY).
4. OUTCOMING SIGNAL POSITIVE POLE (BLACK).

THE RIGHT DRAWING IS THE WIRING DIAGRAM FOR SENSOR AND ECU.

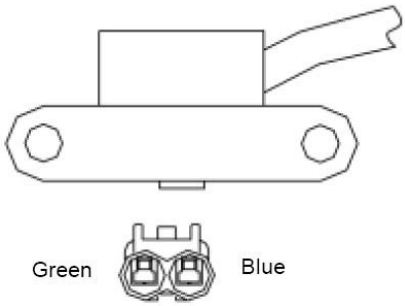


THE BELOW SHEET IS THE SENSOR PERFORMANCE CHARACTERISTIC VALUE.

Quantity	New		After 500Hours Bench Test	
Performance Data Establish Exhaust Temp	350℃	850℃	350℃	850℃
Sensor Voltage(mv) When λ =0.97 (CO=1%)	840 ± 70	710 ± 70	840 ± 80	710 ± 70
Sensor Voltage(MV) When λ =1.10 (CO=1%)	20 ± 50	55 ± 30	20 ± 50	40 ± 40
Sensor Internal Resistance(k Ω)	≦ 1. 0	≦ 0. 1	≦ 1. 5	≦ 0. 3
Response Time(ms) (600mv-300mv)	≦ 150	≦ 150	≦ 300	≦ 200
Response Time(ms) (300mv-600mv)	≦ 150	≦ 150	≦ 300	≦ 200

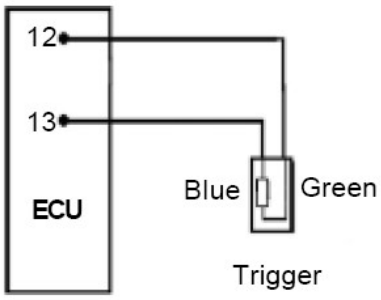
(7)TRIGGER:

PROVIDE ENGINE ROTATE SPEED INFORMATION TO ECU,ECU DETERMINE IGNITION ANGLE,FUEL INJECTION ANGLE ACCORDING TO THIS INFORMATION.



THE RIGHT DRAWING IS THE WIRING DIAGRAM FOR TRIGGER AND ECU.

TESTING THE THRIGGER RESISTANCE VALUE.



● ADJUST **MULTIMETER** TO 1x100Ω

TRIGGER WINDING RESISTANCE:100-130Ω(20℃)

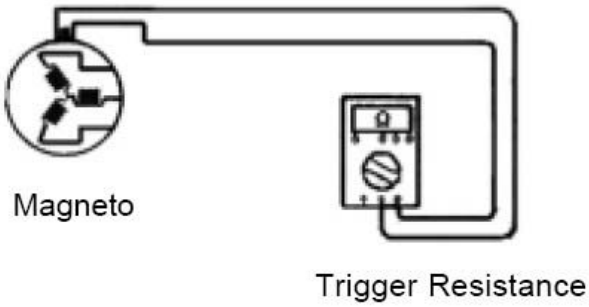
● IF THE TRIGGER RESISTANCE DONOT IN ABOVE RANGE,REPLACE WITH A NEW ONE.

MEASURING TRIGGER PEAK VOLTAGE VALUE.

● CONNECT MULTIMETER AND PEAK VOLTAGE ADAPTER ACCORDING TO THE RIGHT DRAWING:

+PROBE GREEN LEAD WIRE

-PROBE: BLUE LEAD WIRE



ATTENTION:
WHEN USE PEAK VOLTAGE ADAPTER,REFERS TO OPERATION MANUAL.

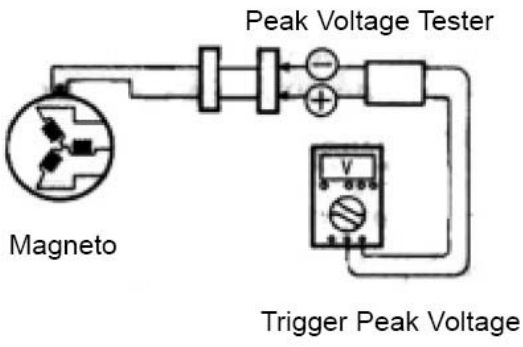
● ADJUST MULTIMETER TO ALTERNATE **V**

● ADJUST THE GEAR TO NEUTRAL, ADJUST IGNITION SWITCH TO"**ON**".

● PRESS ON STARTING BUTTON AND LET THE ENGINE RUNNING FOR FEW SECONDS, THEN START TO MEASURE:
THRIIGER COIL PEAK VOLTAGE.

● REPEATED TIMES MEASURE, GET THE HIGHEST TRIGGER COIL PEAK VOLTAGE VALUE:

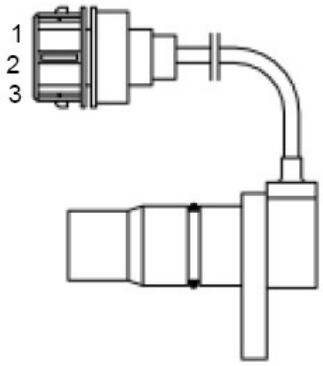
TRIGGER COIL PEAK VOLTAGE: 2V 300rpm).



● IF THE TRIGGER PEAK VOTAGE DONOT IN THE ABOVE RANGE,REPLACE WITH A NEW ONE.

(8)ODOMETER SENSOR:

PROVIDE ENGINE OUTPUT SHAFT SPEED TO ECU, ECU JUDGE VEHICLE SPEED ACCORDING TO THIS INFORMATION.IT IS A KIND OF HALL SWITCH COMPONENTS,IT OUTPUT SQUARE WAVE VIA INDUCTION FIELD.



Odometer Sensor

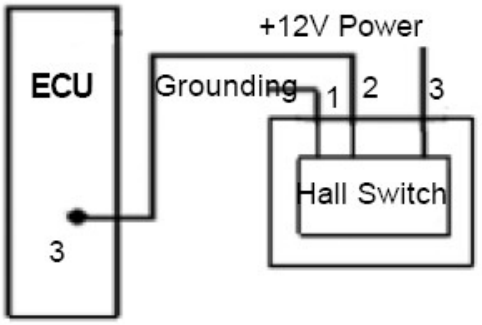
PINS FUNTION:

1.GROUNDING

2.OUTPUT SQUARE WAVE VOLTAGE SIGNAL(＞IN PUT POWER VOLTAGE 80%).

3.POWER+DC12V.

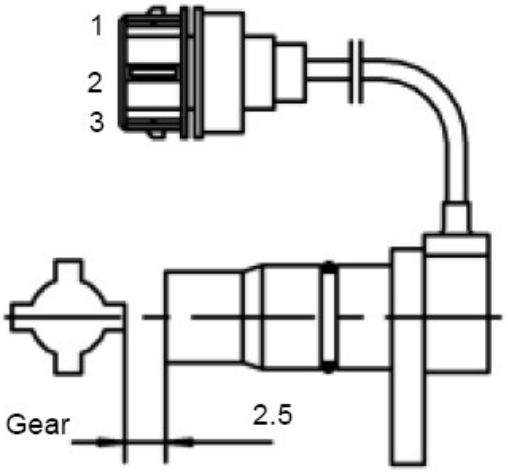
THE RIGH IS THE WIRING DRAWING OF SENSOR AND ECU.



Odometer Sensor Wiring Diagram

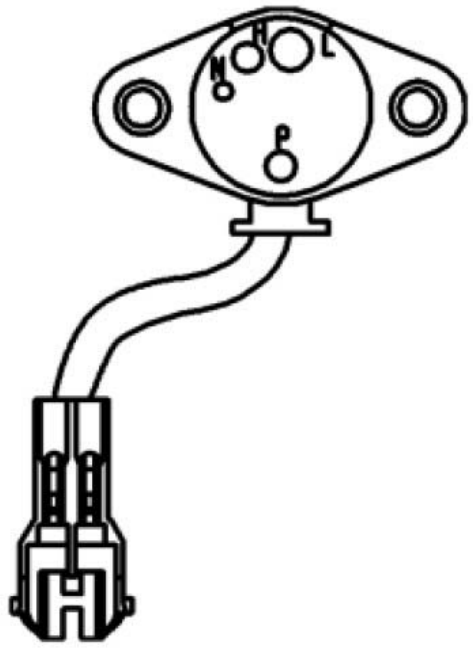
ODOMETER SENSOR TESTING

GROUNDING FOOT 1,CONNECT FOOT 3+12V.
FIXED ONE GEAR TO ODOMETER ACCORDING TO THE RIGHT DIAGRAM DISTANCE(**2.5mm**).
ADJUST MULTIMETER TODCV. ROTATE THE GEAR SLOWLY,MEASURE THE VOLT
AGE VALUE BETWEEN FOOT 2 AND FOOT 3 TO SEE
IF IT IS VARY FROM 0V,12V.
IF NO CHANGES, THEN THE SENSOR IS DAMAGED,
YOU WILL BE REQUIRED TO REPLACE WITH A NEW ONE.



(9)GEAR SENSOR CLUSTER:

PROVIDE GEAR INFORMATION TO THE METER,SOAS TO AT THE SAME TIME,COORDINATE WITH CABLE AS STARTING PROTECTION.



Gear Sensor

FUNCTIONS OF THE FOOTS:

YELLOW/BLUE-L (UNDERDRIVE)

ORANGE/BLUE-H (HIGH POSITION)

YELLOW/BLACK-P (PARK POSITION)

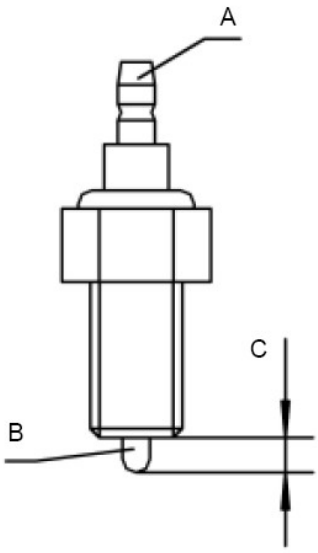
WHITE/YELLOW-N (NEUTRAL POSITION)

● WHEN EACH OF THE FOUR GEAR IN A CERTAIN POSITION,GEAR CORRESPONDING FOOT CON DUCT TO THE ENGINE COVER, OR ELSE IT NONCONDUCTION WITH THE ENGINE COVER.

(10)REVERSE GEAR ASSEMBLE:

PROVIDE GEAR REVERSEINFORMATION TO ECU AND METER,THE ECU ESTRICT VEHICLE SPEED ACCORDING TO THIS INFORMATION.

● NORMALLY,**A**,**B POINT CONDUCTION, DONOT CONDUCT WITH THE CASE.**



● NORMALLY, C LENGTH IS 3.5mm,IF C LENGTH＜3mm,OR IF B SLIDE BLOCK, YOU HAVE TO CHANGE IT TO A NEW ONE.

● WHEN ENGINE BACK GEAR, A POINT NON-CON DUCTION WITH THE ENGINE CASE, OR ELSE IT IS CONDUCT WITH THE CASE.

(11)FUEL PUMP ASSY:

THE OIL FUEL PUMP ASSY COMBINED OF FUEL PUMP,PLASTIC BRACKET PREFILTRATION PRES SURE REGULATING VALVE. IT DELIVER THE FUEL TO THE ENGINE WITH A CERTAIN OIL PRESSURE AND FLOW.

FUNCTIONS OF THE FOOT:

1. BLUE (GROUNDING)
2. (CONNECT FUEL LEVEL SENSOR)
3.
4. ED (CONNECT THE OIL PUMP RELAY OUTPUT ENDING)

PERFORMANCEPARAMETER:

FLOW: **35L/h** PRESSURE REGULATING VALVE OPENING PRESSURE: 0.3±0.01MPa

- THIS FUEL PUMP ASSY ALL USED INSIDE THE FUEL TANK:
- DONOT RUN THE FUEL PUMP ASSY IN DRY;
- HANDLE GENTLY, DONOT DROP THE FUEL PUMP ASSY ONTO THE GROUND.

THE RIGHT DIAGRAM IS THE WIRING DIAGRAM OF THE OIL PUMP ASSY,OIL PUMP RELAY,ECU.

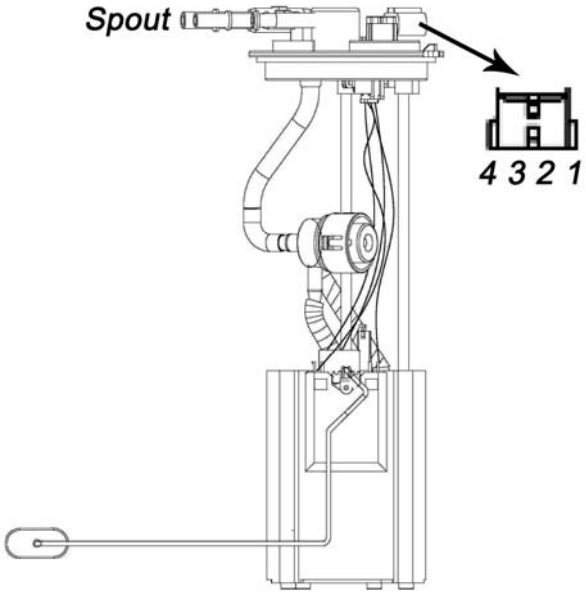
- BATTERY SUPPLY POWER VIA FUEL PUMP RELAY, ELECTRIC OIL FUEL PUMP CIRCUIT CLOSE ONLY WHEN STARTING AND THE ENGINE RUNNING.

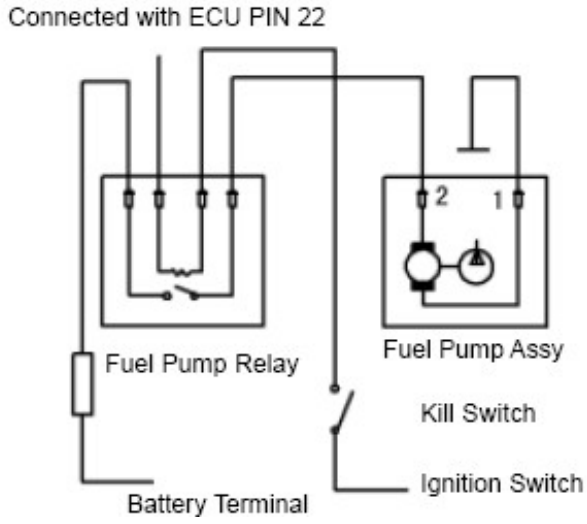
MEASURING THE FUEL PRESSURE:

- CONNECT FUEL PRESSURE GAUGE TO THE FUEL PUMP FUEL DISCHARGE PORT,LOCK WITH CLAMP,ENSURE THERE IS NO LEAKAGE IN CONNECT AREA:
- LINK THE CIRCUIT ACCORDING TO THE ABOVE DIAGRAM;
- TURN OFF THE IGNITION SWITCH,AND KILL SWITCH;
- AT THIS MOMENT,THE FUEL PUMP WILL WORKING FOR 5 SECONDS,WHEN IT STOP,THE FUEL PRESSURE SHALL REACH THE AUTHORIZED PRESSURE,OR ELSE,REPLACE THEENTIRE FUEL PUMP ASSY;
- WHEN STOPED OPERATION,PRESSURE HOLDING AT LEAST 0.2MPa 5 MINUTES, IF NOT, REPLACE THE FUEL PUMP ASSY.

OIL FUEL PIPE PRESSURE RELIEF:

BECAUSE OF THE HIGH PRESSURE OF FUEL SUPPLY,THE FUEL PIPES ARE ALL HIGH PRESSURE RESISTANCE PIPE.EVEN IF THE ENGINE DOES NOT WORK,THERE IS STILL HIGH PRESSURE ON THE FUELCHANNEL,THEREFOR,DONOT DISMANTLE THE FUEL PIPE DURING SERVICING EASILY. BEFORE SERVICE THE FUEL SYSTEM,YOU REQUIRED TO DOFUEL PRESSURE RELIEF,THE METHOD IS AS BELOW:

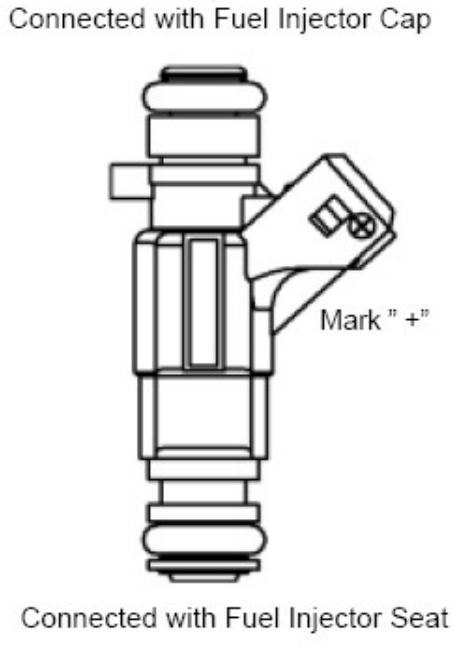




REMOVE FUEL PUMP RELAY, START THE ENGINE AND RUN ENGINE ON IDLE UNTILL THE ENGINE GO OUT IT SELF.

(12)FUEL INJECTOR:

FUEL INJECTOR ONE END INSTALLED IN SEAT, THE OTHER END CONNECT WITH THE FUEL PIPE VIA FUEL INJECTOR CAP.ACCORDING TO THE ECU INSTRUCTION, IT SPRAY FUEL IN FIXED TIME.SO AS TO SUPPLY OIL TO THE ENGINE AND ATOMIZING. THIS FUEL INJECTOR APPLY QUADRIPUNTAL, DO NOT TURN AFTER FIXED THE CLAMP.

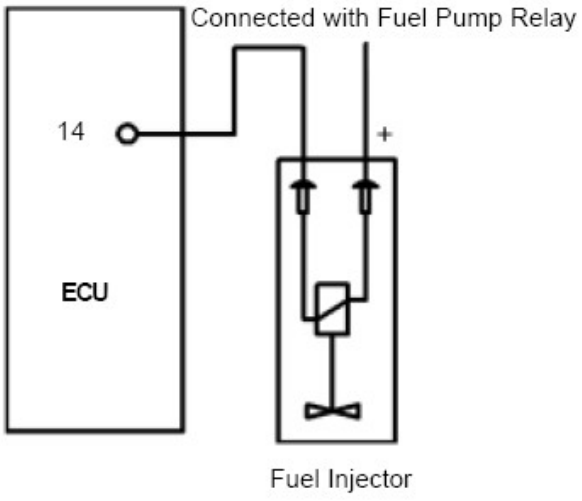


FUNCTION OF PINS:

- ONE SIDE OF THE PLUG **MARK**+CONNECT FUEL PUMP RELAY OUTPUT END, WITHOUT MARK SIDE CONNECT ECU PIN 14.

OIL ATOMIZER RESISTANCE: 12±1Ω (20℃)

THE RIGHT IS THE WIRING DIAGRAM FOR FUEL INJECTOR AND ECU.

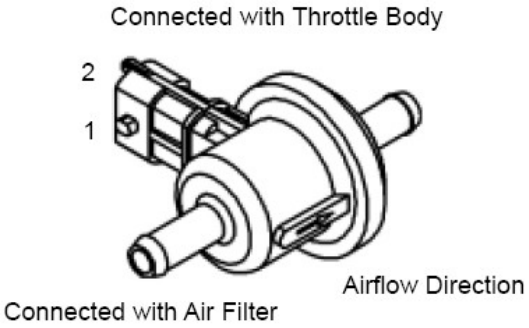


FUEL INJECTOR INSTALLATION:

- INSTALL THE FUEL INJECTOR BY PUSHING IN HAND.
- WHEN DISASSEMBLE AND ASSEMBLING THE FUEL INJECTOR,YOU MUST REPLACE THE O RING.
- WHEN DISMANTLING FUEL INJECTOR, IF NECESSARY,DO PRESSURE RELIEF IN ADVANCE.
- CHECK FOR FUEL LEAKS AFTER INSTALLING.

(13)IDLE SPEED CONTROL VALVE (CARBON TANK CONTROL VALVE):

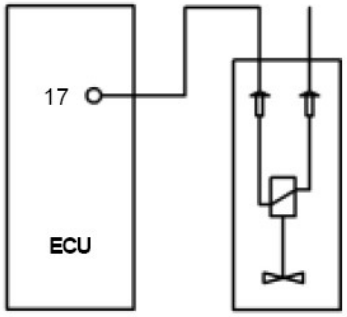
CONTROL PASS-BY AIR FLOW. ECU CONTROL THE IDLE SPEED VALVE ACCORDING TO THE INFORMATION OF ENGINE LOAD,THE ELECTRICAL PULSE DURATION,ANDFREQUENCY:(DUTYRATIO)THE IDLE SPEED VALVE HAS DIFFERENT AIR FLOW UNDER DIFFERENT PRESSURE ,SO IT MUST BE CONNECTED ACCORDING TO PRESCRIPTIVE METHOD,OR ELSE WILL CAUSE INCORRECT IDLE SPEED,WHEN WITHOUT ELECTRICAL PULSE,IDLE SPEED VALVE CLOSE.



FUNCTION OF PINS:

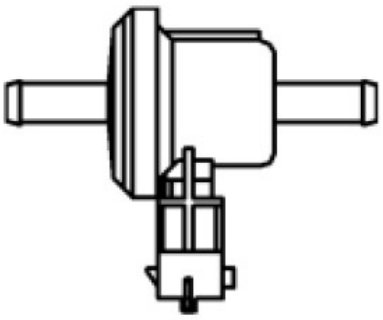
1. CONNECT PIN 17.
2. CONNECT OIL PUMPRELAY OUTLET END.

THE RIGHT IS THE WIRING DIAGRAM FOR IDLE SPEED VALVE AND ECU.



Idle Air Control Valve

- WHEN FIXING THE IDLE SPEED CONTROL VALVE,IT CANNOT BE INSTALLED LIKE THE RIGHT DIAGRAM (CONNECTOR **VERTICALLY DOWNWARD) TO AVOID DESTROY THE ELECTRONIC COMPONENT**.
- TO AVOID SOLID-BORNE SOUND TRANSMISSION, YOU CAN INSTALL THE IDLE AIR CONTROL VALVE SUSPENDED IN THE TUBE,OR USE RUBBER BOOT TO FIX IT TO THE ENGINE OR THE FRAME.


Incorrect Installation

IDLE SPEED CONTROL VALVE PARAMETER LIST:

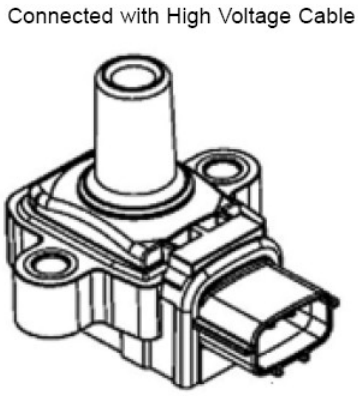
Quantity	Value		Max	Unit
	Min	Typical		
Rated Voltage		13.5		V
Resistance at 20℃		16		Ω
Rated Current		0.85		A
Pulse Control Frequency				HZ
Typical Pulse Control Width		≦ 8		m s
Pressure Difference =700mbar Share Air Ration 100% Flow		5.00		㎥/h

(14)IGNITION COIL:

IGNITION COIL CHANGE THE PRIMARY WIND ING LOW VOLTAGE INTO SECONDARY WINDING HIGH VOLTAGE,THROUGH SPARK PLUG DISCHARGE TO CREAT SPARK,FIRING THE FUEL AND GAS MIXTURE.

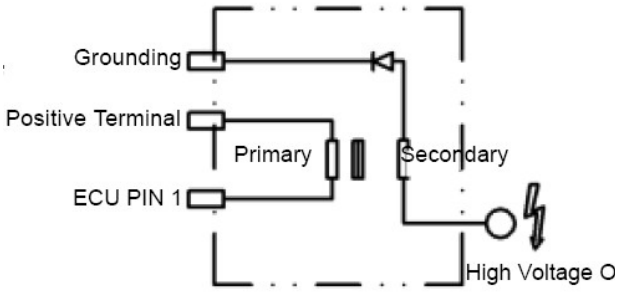
FUNCTION OF PINS:

1. GROUNDING.
2. CONNECT POWER+.
3. CONNECT ECU 1 POINT;



Ignition Coil

THE RIGHT IS THE CONNECTION CIRCUIT DIAGRAM OF IGNITION COIL AND ECU.



Ignition Coil Wiring

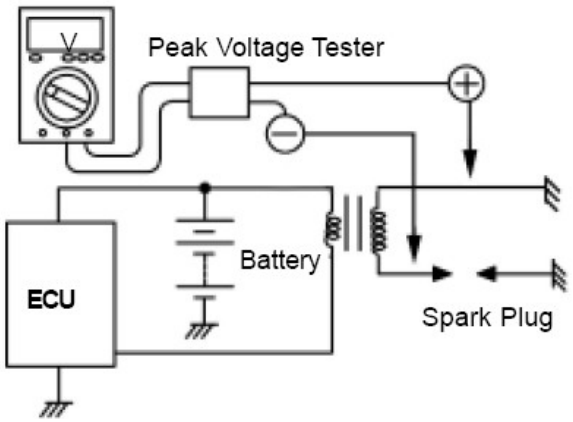
MEASURING SECONDARY IGNITION VOLTAGE:

● CONNECT THE ENGINE ACCORDING TO THE ELEC TRONIC-SPRAY ELEMENTARY DIAGRAM.

● CONNECT THE PEAK VOLTAGE GUAGE ACCORD ING TO THE RIGHT DIAGRAM.

● START THEENGINE.

● AFTERSTARTS ,THE SECONDARY IGNITION VOLT AGE SHOULD BE **15000**V.



IGNITION COIL PARAMETER LIST:

Quantity		Value			Unit
		MIN	Typical	MAX	
Rated Voltage			14		V
Working Voltage		6		16.5	V
Resistance (20-25℃)	Primary Winding	0.74	0.76	0.78	Ω
	Secondary Winding	10.1	10.6	11.1	k Ω
Primary Current			7		A

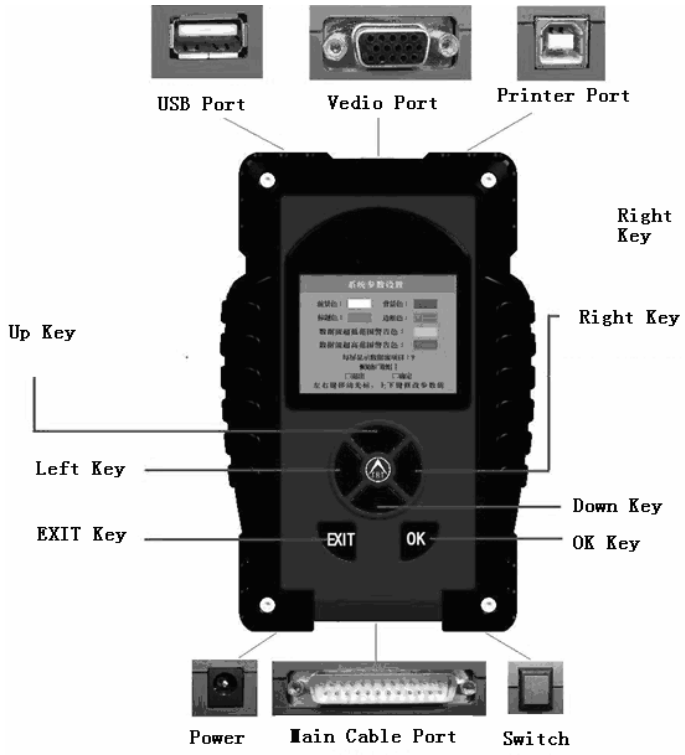
ELECTRONIC FUEL INJECTION SYSTEM
FAULT SELF-DIAGNOSIS

ECU CONTINUOUSLY MONITOR THE SENSOR,ACTUATOR,RELEVENTCIRCUIT ,TROUBLE LAMP,BATTERY VOLTAGE ETC,EVEN THE ECU ITSELF.ALSO THE SENSOR OUTPUT,ACTUATOR DRIVING SIGNAL,INTERNAL SIGNAL(SUCH AS CLOSED-LOOP CONTROL COOLANT TEMPERATURE,IDLING SPEED CONTROL,BATTERY VOLTAGE CONTROL ETC),DO THE RELIABILITY MEASUREMENT. ONCE DISCOVER SOME WHERE BREAK DOWN,OR SOME SIGNAL VALVE UNTRUSTED,THE ECU WILL IMMEDIATELY SET UP FAULT RECORD INFORMATION IN RAM TROUBLE MEMORY.THE FAULT INFORMATION STORE AS TROUBLE CODE,AND DISPLAY THE FAULT IN IT'S EMERGENCE SEQUENCE. THE FAULT CANBE DIVIDED INTO TWO TYPES ¡°STEADY FAULT¡± AND RANDOM FAILURE ACCORDING TO IT¡¯S EMERGENCE FREQUENCY(SUCH AS CAUSED BY BRIEF WIRE TURNOFF OR BAD CONNECTION OF THE CONNECTOR.)
THROUGH DIAGNOSTIC EQUIPMENT AND THE TROUBLE LAMP YOU CAN FIND THE TROUBLE PART QUICKLY.

ELECTRONIC FUEL INJECTION SYSTEM FAULT DIAGNOSIS MAINLY APPLY DIAGNOSTIC EQUIPMENT.

DIAGNOSTIC EQUIPMENT:

THE RIGHT IS THE DIAGNOSTIC EQUIPMENT OPERATION FUNCTIONS INDICATOR DIAGRAM.SPECIFIC OPERATION AND IT'S FUNCTIONS PLEASE REFERS TO THE DIAGNOSTIC EQUIPMENT OPERATING MANUAL.

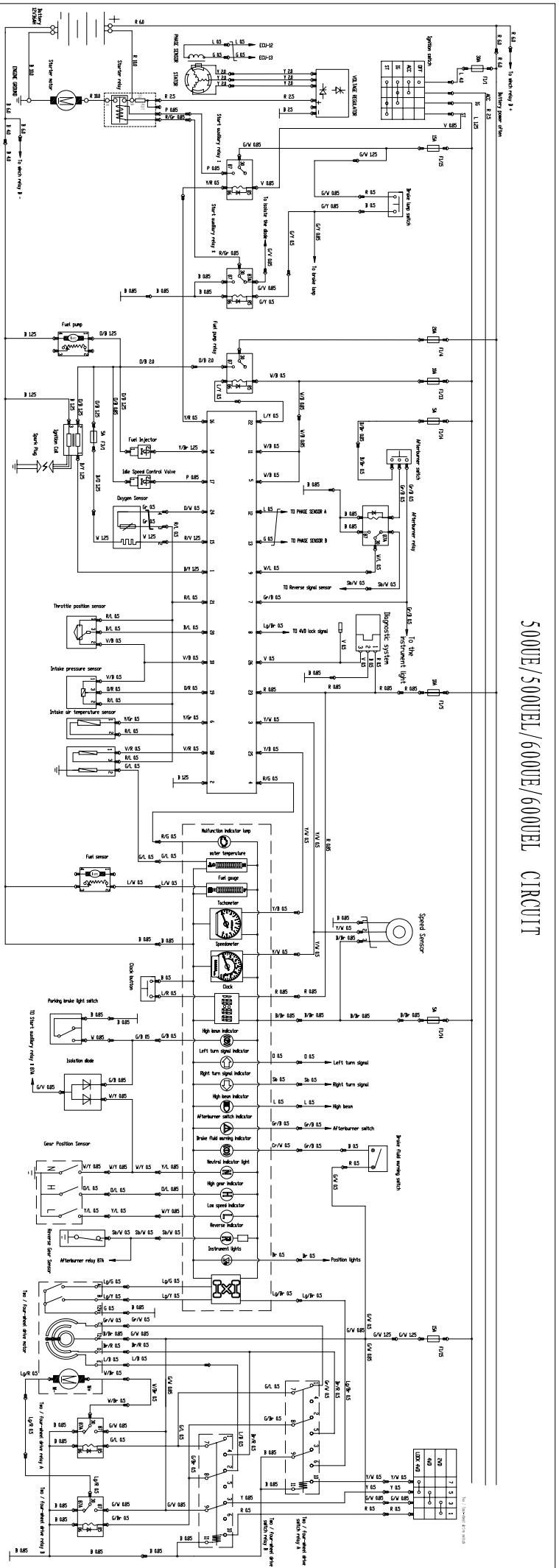


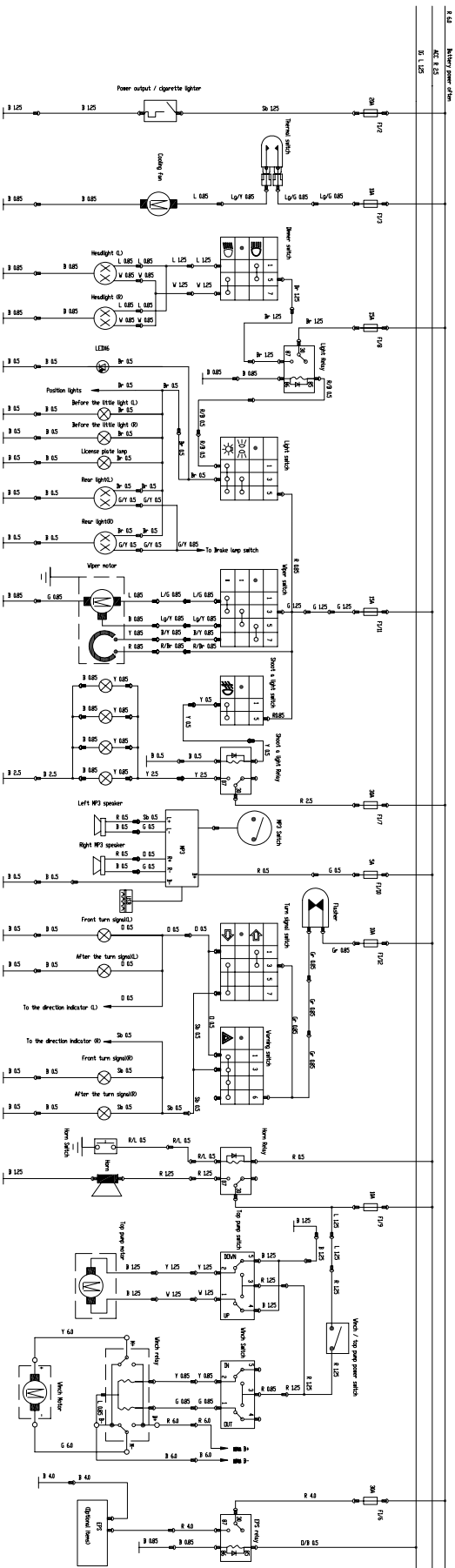
TROUBLE CODE LIST:

REF	TROUBLE CODE	INSTRUCTION
1	P0030	OXYGEN SENSOR HEA TING CONTROL CIRCUITOPEN CIRCUIT
2	P0031	OXYGEN SENSOR HEATING CONTROL CIRCUITSHORT TO GOUND
3	P0032	OXYGEN SENSOR HEA TING CONTROL CIRCUITSHORT CIRCUIT TO POWER
4	P0053	OXYGEN SENSOR HEA TING INTERNAL RESISTANCE UNREASONABLE
5	P0105	INLE T PRESSURE SENSOR SIGNAL NO CHANGE（ICE UP ）
6	P0106	INLE T PRESSURE SENSOR UNREASONABLE
7	P0107	INLE T PRESSURE SENSOR UNREASONABLE
8	P0108	INLE T PRESSURE SENSOR SHORT CIRCUIT TO POWER
9	P0112	INLE T AIR TEMPERATURE SENSOR SIGNAL VOLTAGE TOO LOW
10	P0113	INLE T AIR TEMPERATURE SENSOR SIGNAL VOLTAGE TOO HIGH
11	P0116	ENIGNE COOLANT TEMPERATURE S ENSOR UNREASONA BLE
12	P0117	ENIGNE COOLANT TEMPERATURE S ENSOR C IRCUIT VOLTAGE TOO LOW
13	P0118	ENIGNE COOLANT TEMPERATURE S ENSOR C IRCUIT VOLTAGE TOO H IGH
14	P0122	THROTTLE POSITION S ENSOR CIRCUIT VOLTAGE UNDER LIMINAL VALUE
15	P0123	THROTTLE POSITION S ENSOR CIRCUIT VOLTAGE EXCEED L IMINAL VALUE
16	P0130	OXYGEN SENSOR SIGNAL UNREASONA BLE
17	P0131	OXYGEN SENSOR SIGNAL CIRCUIT VOLTAGETOO LOW
18	P0132	OXYGEN SENSOR SIGNAL CIRCUIT VOLTAGETOO HIGH
19	P0134	OXYGEN SENSOR CIRCUIT SIGNAL TROUBLE
20	P0201	1 CY LINDER OIL ATOMIZER CONTROL CIRCUIT OPE N CIRCUIT
21	P0261	1 CY LINDER OIL ATOMIZER CONTROL CIRCUIT S HORT CIRCUIT TO GOUND
22	P0262	1 CY LINDER OIL ATOMIZER CONTROL CIRCUIT S HORT CIRCUIT TO POWER
23	P0321	TRANSIENT SPEED S IGNAL REFERENCE POINT TROUBL
24	P0322	NO TRIGGER(VEHICLE S PEED) PULSE SIGNAL (OPEN CIRCUIT OR SHORT CIRCUIT)
25	P0501	VEHICLE SPEED SENSOR SIGNAL UNREASONAB LE
26	P0506	IDLE SP EED CONTROL ROTATING SPEED LOWER THAN TARGET IDLE SPEED
27	P0507	IDLE SP EED CONTROL ROTATING SPEED HIGHER THAN TARGET IDLE SP EED

REF	TROUBLE CODE	INSTRUCTION
28	P0560	SYSTEM BATTERY VOLTAGE SIGNA L UNREASONABLE
29	P0562	SYSTEM BATTERY VOLTAGE TOO LOW
30	P0563	SYSTEM BATTERY VOLTAGE TOO HIGH
31	P0602	ECU CODING TROUBLE
32	P0627	OIL PUMP RELAY CONTROL CIRCUIT OPENING
33	P0628	OIL PUMP RELAY CONTROL CIRCUIT SHORTCIRCUIT TO GROUND
34	P0629	OIL PUMP RELAY CONTROL CIRCUIT SHORTCIRCUIT TO POWER
35	P0650	MIL LAMP DRIVING STAGE TROUBLE
36	P2177	AIR FUEL RATIO CLOSED-LOOP CONTROL SELF-LEARNING V ALUE EXCEED UPP ER LIMIT
37	P2178	AIR FUEL RATIO CLOSED-LOOP CONTROL SELF-LEARNING V ALUE UNDER LOWER LIMIT
38	P1117	IDLE AIR CONTROL TEV SHORT CIRCUIT TO GROUND
39	P1118	IDLE AIR CONTROL TEV OPEN C IRCUIT

500UE/500UEL/600UE/600UEL CIRCUIT





Code	Definition
B	Black
Br	Brown
G	Green
Gr	Grey
L	Blue
Lg	Light green
O	Orange
P	Pink
R	Red
Sb	Sky blue
V	Violet
W	White
Y	Yellow

Code	Definition
B/W	Black/White
Br/W	Brown/White
G/W	Green/White
Gr/W	Grey/White
L/W	Blue/White
Lg/R	Light green/Red
O/B	Orange/Black
P/Y	Pink/Yellow
R/W	Red/White
Sb/W	Sky blue/White
V/B	Violet/Black
W/Y	White/Yellow
Y/W	Yellow/White

| | | |

Overhaul Info……12-1
Troubleshooting……12-2
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headlight……12-5
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Handlebar Switch……..12-7
Brake Light Switch…….12-8
Horn…… 12-8
Fuel Sensor…… 12-9
Water Temperature Transducer……12-10

Overhaul Information

Warning

- Headlight bulb will be very hot when it is turned on. Do not touch it after it is just turned off. Operation should be done when the bulb is cooled down.
- Inspection of water temperature alarm may use fire source and liquid of high temperature. Do not put flammable matters nearby and take care not to get burnt.
- The temperature of headlight is quite high when turned on. Replacing with bare hand or stained glove will cause oil stains on the glass face which may form hot spot and cause deformation of glass face and damage to bulb.
- Pay attention to the following when replacing the bulb.
  —Do not replace the bulb when it is turned on. Keep ignition switch in the OFF position, and replace after the bulb is cooled down.
  —Replace the bulb with hands in clean gloves to avoid oil stains on the glass surface.
  —Clean the glass with a clean rag dipped in alcohol or isoamyl acetate in case of any oil stains on the glass surface.
- If the Inspection has to be done with battery, check if the battery is normal.
- Inspection of switch continuity can be done without removing the switches from the vehicle.
- After the inspecting and overhauling of each part, cables and wires should be routed properly (chapter 1) Refer to Chapter 2 for removal and installation of taillight and rear turning lights.

Overhaul Standard

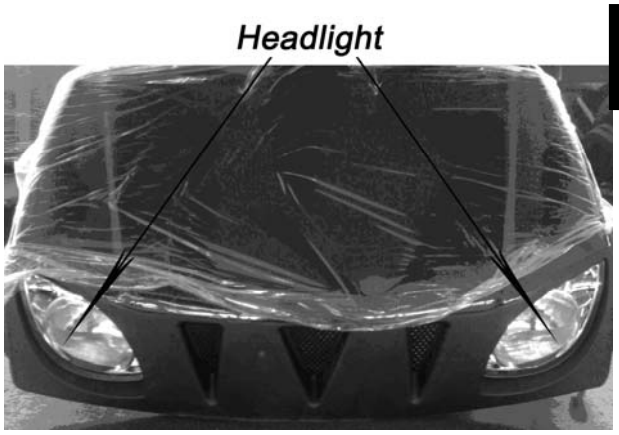
Item		Standard
Fuse	Mail switch fuse	30A
	Sub-fuse	
Light, bulb	Headlight	**12 V 35 W/35W × 2**
	Brake light /Tail light	
	Turning light	**12 V 5 W× 2**
	Dashboard Indicator	
	Indicators	

TROUBLESHOOTING

Head Light Cannot Turn On

- Broken fuse
- Open circuit with main cable
- Burnt Bulb
- Faulty Switch

Replacing Bulb



Headlight Bulb

Headlight bulb will be very hot when it is turned on. Do not touch it after it is just turned off.

Operation should be done when the bulb is cooled down.

Remove headlight(→13-5）

Disconnect headlight.

Remove dust-proof cap, headlight connector, circlip and replace with a new bulb.

Warning:

- Wear clean gloves when replacing bulb.
- Oil stains on the glass surface may cause break of bulb. Clean the stained surface with alcohol or isoamyl acetate.
- Make sure that the three pins of the bulb should be in line with the three positioning holes in the socket when replacing the bulb.

Bulb specification: **12 V 35 W/35W**

Reverse the removal procedure for installation

After replacing the bulb, adjust headlight beam

Inspection of Headlight

Turn the ignition switch to ON position, turn light switch to the illuminating position and check if the headlight is on.

-ON: Normal

-Still off: short circuit of main cable or broken main cable.

Brake Light/Tail Light Bulb

Remove 2 tapping screws,

Remove tail light cover.

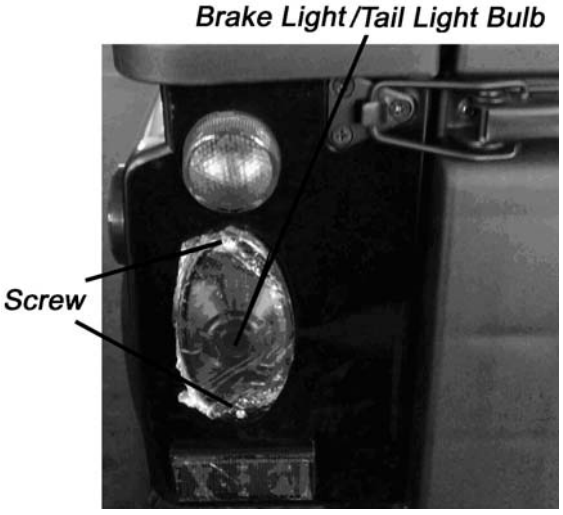
Turn brake light/tail light bulb counter clockwise

And remove it.

Replace brake light/tail light bulb

Bulb Specification: 12V 21/5W

Reverse the removal procedure for installation



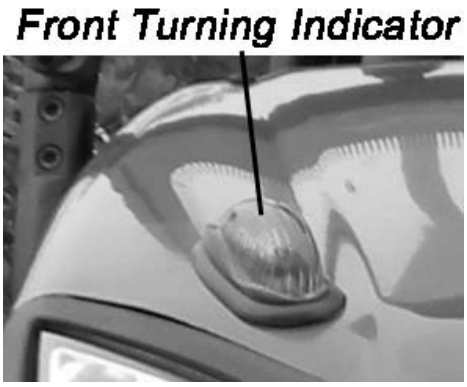
Front Turning Indicator Bulbs

Remove headlight (→13-5)

Remove cover of front turning light

Replace front turning light bulbs

Bulb Specification: **12 V 10 W**



Rear Turning Indicator Bulbs

Remove screw

Remove rear turning indicator cover.

Replace rear turning indicator bulbs.

Bulb Specification: 12V-10W

Reverse the removal procedure for installation.

Dashboard Lighter Bulb

Remove dashboard (→13-9)

Remove bulb socket and replace with a new bulb.

Bulb specification: 12V-1.7W

Note:

Main cable and wires should be routed properly (→chapter 1)

Reverse the removal procedure for installation.

Dashboard Indicator Bulb

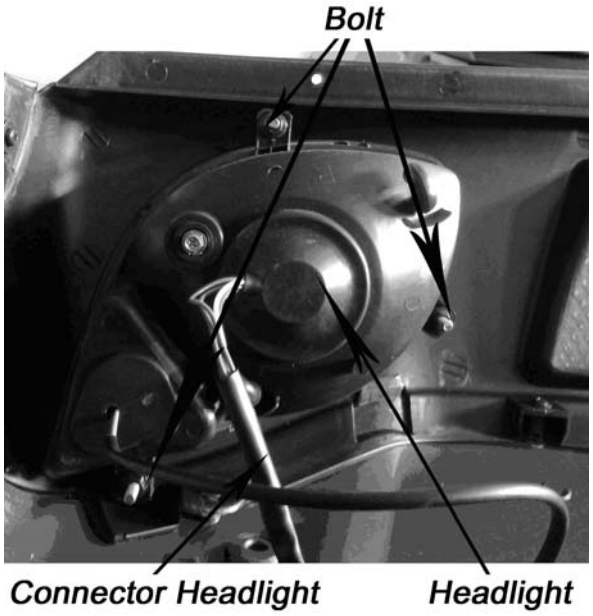
Remove dashboard (→13-9)
Remove dashboard indicator socket.
Remove indicating light bulb and replace with new one.

Bulb specification: 12V-3.4W

Reverse the removal procedure for installation.

Headlight

Remove:—Front fender(→2-8)
—3 fixing bolts of headlight cover.
—Headlight cover
—Fixed bolt headlight, headlight connector, Headlight



Disconnect headlight connector.
Reverse the removal procedure for installation.

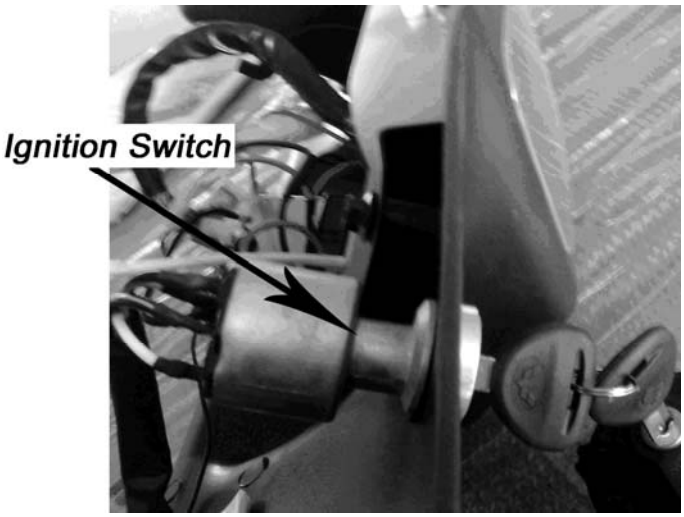
Note:
Be careful not to damage main cable when assembling.

After replacing, adjust the headlight beam.
(→chapter 3)

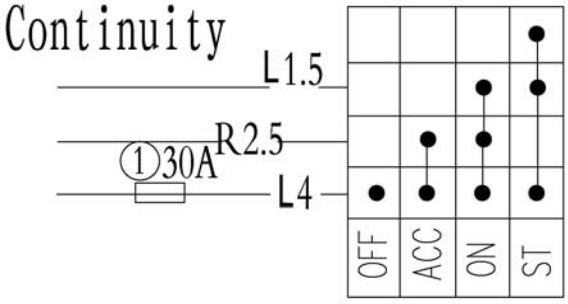
Note
Main cables and wires should be routed properly.(→chapter 1)

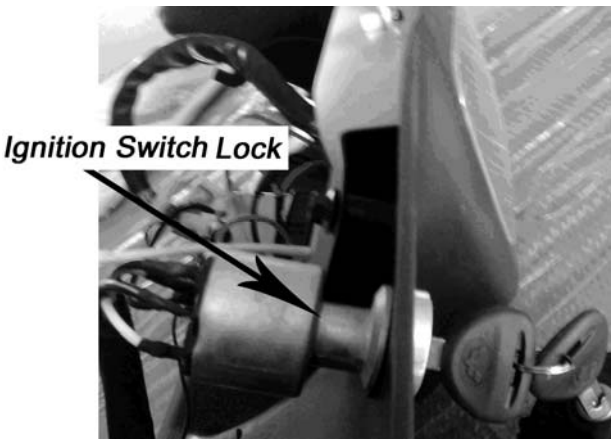
Ignition Switch
Inspection
Remove front & rear top cover(→2-5)

Disconnect 4P connector of ignition switch



Check according to the following table if the connector terminals are in continuity.





Remove:

Remove holder, meter (→2-3)

Disconnect 4P connector of ignition switch

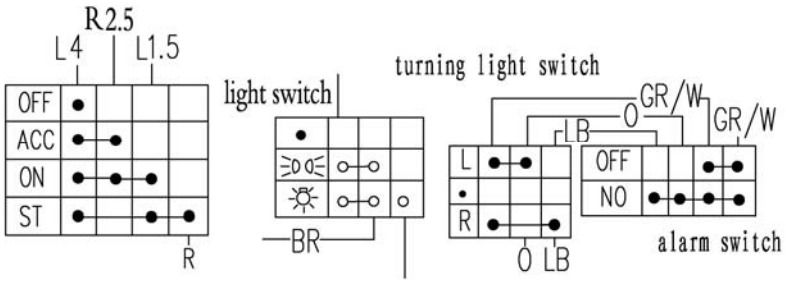
Reverse the removal procedure for installation

Combined Switch

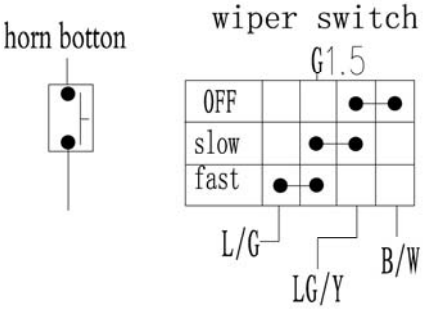
Remove front &rear cover of steering rack (→2-2)

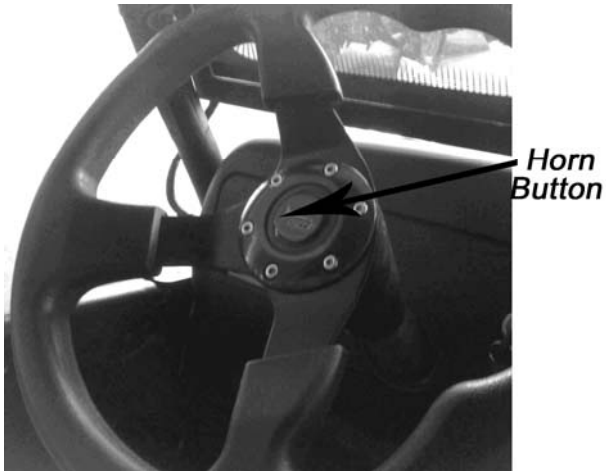
Remove combined switch（→2-3）

Disconnect connector of combined switch
Check according to the following table if the connector terminals are in continuity.

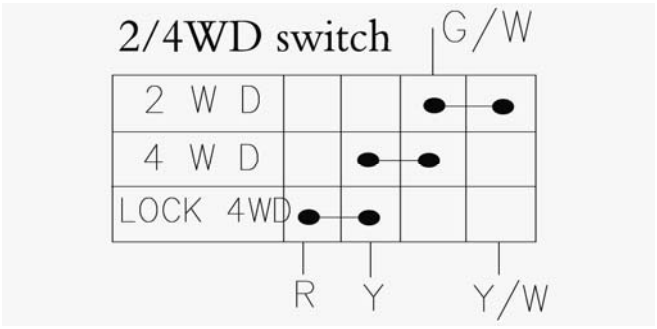


Horn Button

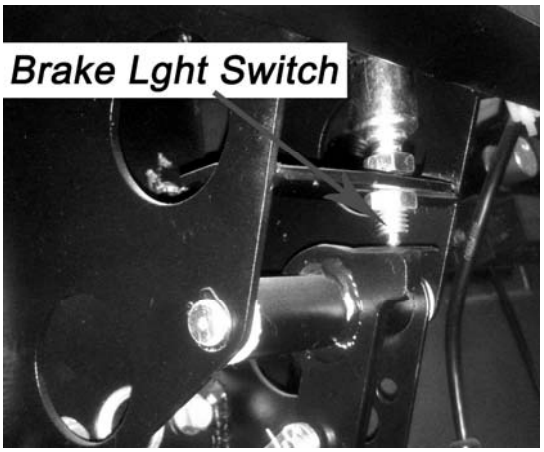




2WD、4WD、4WD Diff-Lock Switch



No continuity: Change the switch.



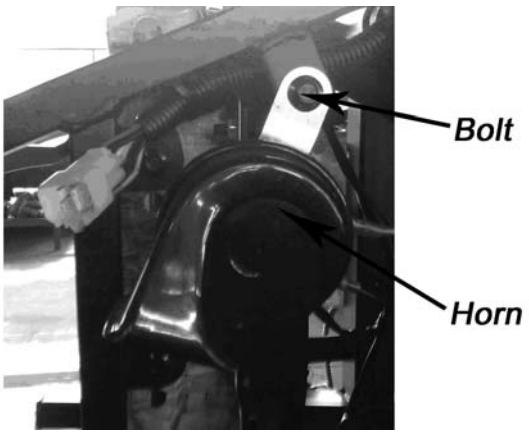
Brake Light Switch
Disconnect brake light switch connector and check terminators for continuity.

Hold the brake lever——Continuity
Release the brake lever—No continuity
No continuity: Replace brake light switch

Horn

Inspection:

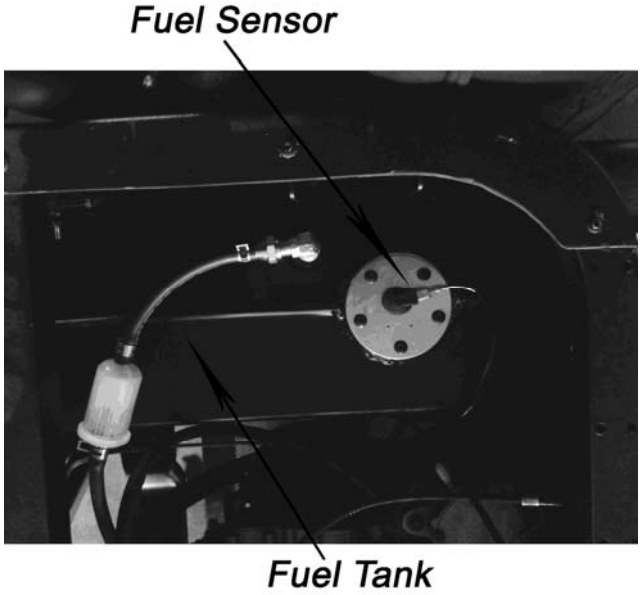
Remove engine cover (→2-3)
Disconnect horn.
Connect with a fully charged 12V battery and check if the horn sounds.
Faulty Horn: →Replace



Fuel Sensor (Carbureter)

Remove:

—Fuel tank top cover with key
—5 fixing bolts
—Fuel sensor
Disconnect 2P connector



Inspection

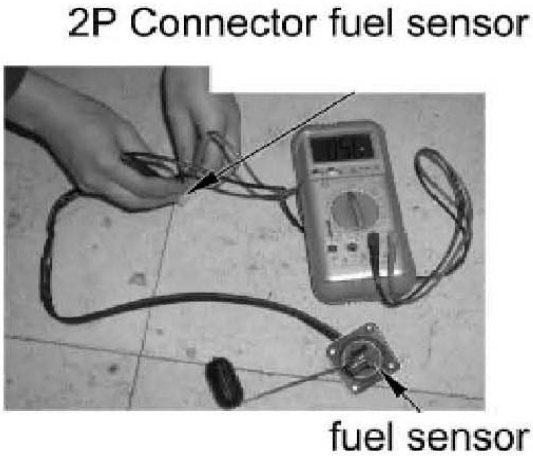
Remove fuel sensor (refer to above steps)

Connect 2P connector

Turn ignition switch to ON

Shake fuel sensor float with hand, locate the float po-
Sition and check if it conforms to the fuel gauge reading.

Non-conformity: -check main cable for damage or short circuit
-Check fuel sensor and fuel gauge



Remove fuel sensor 2P connector.

Connect multimeter between 3P connector terminals.

Shake float with hand and measure the resistance of float at different positions.

Connection Terminal:
Upper: 3 ± 2Ω(20℃)0

Lower: 110 ± 5 Ω(20℃)

Faulty fuel sensor: →Replace

Installation
Put fuel sensor into installation hole of fuel tank.

Fuel sensor should be fitted properly.

No fuel leakage is allowed.
Connect 2P connector

Inspection of Fuel Gauge

Switch on power supply and check if fuel level gauge functions normally.
If fuel gauge works normally,
Reverse the removal procedure for installation of plastic parts and seat.

Water Temperature Transducer

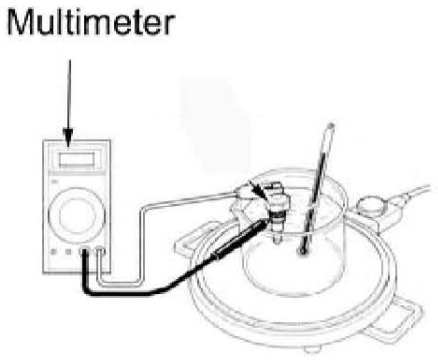
Water Temperature Transducer

Warning:
Be careful not to get scalded and do not place flammables nearby.

Warning

- **Coolant must reach the switch thread, and the depth from vessel bottom to sensor top should be over 40mm.**
- **Keep liquid temperature for three minutes before measuring, and do not raise temperature sharply.**
- **The thermometer should not contact the vessel bottom.**

Disassembly:
Remove seat, driver and skid plate (chapter 2)



Disconnect and remove transducer.
Put the transducer into a vessel with coolant, slowly heat up the liquid and measure the transducer resistance.
Temperature Resistance

50℃	154 ±16 Ω
80℃	52 ±4 Ω
100℃	27 ±4 Ω
120℃	16 ±4 Ω

Transducer out of range: →Replace

Install transducer
Connect water temperature transducer connector.
Fill coolant and discharge air
Reverse the removal procedure for installation of plastic parts and seat.

1. Engine troubleshooting.....13-2
2. Diagnosis troubles according to EFI system Trouble Code.....13-5
3. Diagnosis troubles according to engine fault phenomena.....13-14

1.Engine troubleshooting

Complaint	Symptom and Possible Causes	Remedy
Engine will not start or is hard to start	**Compression is Too Low**	
	1.Worn cylinder	Replace
	2.Worn piston ring	Replace
	3.Leakage with cylinder gasket	Replace
	4.Wear valve guide or improper valve seating	Repair or Replace
	5.Loose spark plug	Tighten
	6.Slow cranking of starting motor	Check electrical part
	7.Faulty valve timing	Adjust
	8.Improper valve clearance	Adjust
	No Spark from Spark Plug	
	1. Fouled spark plug	Clean or Replace
	2. Wet spark plug	Clean and dry or replace
	3. Defective ignition coil	Replace
	4. Open or short circuit with pickup coil	Replace
	5. Faulty generator	Replace
Engine stalls easily or has unstable idle speed	1. Improper valve clearance	Adjust
	2. Improper valve seating	Replace or Correct
	3. Faulty valve guide	Replace
	4. Worn rocker arm or rocker arm shaft	Replace
	5. Fouled spark plug	Replace
	6. Improper spark plug gap	Replace or Adjust
	7. Faulty ignition coil	Replace
	8. Clogged idle-vale inlet & exhaust pipe	Adjust Fuel level
	9. Faulty magneto	Replace

Complaint	Symptom and Possible Causes	Remedy
Poor engine running in high-speed range.	1. Weak valve spring	Replace
	2. Worn camshaft	Replace
	3. Fouled spark plug	Clean or replace
	4. Insufficient spark plug gap	Adjust or replace
	5. Improper valve timing	Replace
	6. Faulty ignition coil	Adjust
	7. Weak high pressure fuel pump, resulting in poor fuel supply	Adjust or replace
	8. Dirty air filter	Clean or replace
Exhaust smoke is dirty or thick	1. Excessive engine oil	Check oil level and drain
	2. Worn piston ring	Replace
	3. Worn valve guide	Replace
	4. Scored or scuffed cylinder wall	Replace
	5. Worn valve stem	Replace
	6. Worn valve stem oil seal	Replace
Engine lacks power	1. Improper valve clearance	Adjust
	2. Weak valve spring	Adjust
	3. Improper valve timing	Adjust
	4. Worn cylinder	Replace
	5. Worn piston ring	Replace
	6. Improper valve seating	Replace or Correct
	7. Fouled spark plug	Clean or replace
	8. Improper spark plug gap	Clean or replace
	9. Clogged fuel injector	Clean or replace
	10. Dirty air filter	Adjust fuel level
	11. Worn rocker arm or rocker arm shaft	Clean or replace
	12. Air leakage from air intake pipe	Tighten or replace
	13. Excessive engine oil	Check oil level and drain
Engine overheats	1. Carbon deposit on piston top	Clean
	2. Insufficient or excessive engine oil	Check level, add or drain
	3. Faulty oil pump	Replace
	4. Clogged oil passage	Clean
	5. Air leakage from air intake pipe	Tighten or replace
	6. Incorrect engine oil	Change engine oil
	7. Faulty cooling system(7-5)	

Complaint	Symptom and Possible Causes	Remedy
Engine is noisy	**Valve Chatter**	
	1. Excessive valve clearance	Adjust
	2. Worn or broken valve spring	Replace
	3. Worn rocker arm or camshaft	Replace
	Noise from Piston	
	1. Worn piston	Replace
	2. Worn cylinder	Replace
	3. Carbon deposit in combustion chamber	Clean
	4. Worn piston pin or pin hole	Replace
	5. Worn piston ring or piston ring groove	Replace
	Noise from Timing chain	
	1. Stretched chain	Replace chain & sprocket
	2. Worn sprocket wheel	Replace chain & sprocket
	3. Faulty chain tensioner	Repair or replace
	Noise from Clutch	
	1. Worn or damaged crankshaft spline	Replace crankshaft
	2. Worn inner race spline	Replace inner race
	Noise from Crankshaft	
	1. Rattling bearing	Replace
	2. Worn or burnt crank pin bearing	Replace
	3. Excessive thrust clearance	Replace
	Noise from CVT	
	1. Worn or slipping drive belt	Replace
	2. Worn rollers in primary sheave	Replace
	Noise from Transmission	
	1. Worn or damaged gear	Replace
	2. Worn or damaged input or output shafts	Replace
	3. Worn bearing	Replace
	4. Worn bushing	Replace
Slipping Clutch	1. Worn or damaged clutch shoes	Replace
	2. Weakened clutch shoe spring	Replace
	3. Worn clutch housing	Replace
	4. Worn or slipping drive belt	Replace

2 Diagnosis troubles according to EFI system Trouble Code

NOTE:

1. Only start inspection and fixation when trouble is steady-state; otherwise diagnosis would probably be wrong.

2. The “multimeter” mentioned below are numerical mutimeter; it is forbidden to use pointer type multimeter to make EFI system inspecting.

3. When Trouble Code tells “Low Voltage”, means probably it’s Short Circuit to Ground or Broken Circuit; When Trouble Code tells “High Voltage”, means probably it’s Short Circuit to Power; When Trouble Code tells “Circuit Error”, means Circuit Broken or Various Errors Exist.

Diagnosis Help:

1. Trouble Code cannot be cleared, means trouble is steady-state; Focusing on the connector wires’ possible looseness if trouble is incidental.

2. When making inspections, do not ignore possible affect from vehicle maintenance condition, cylinder pressure, mechanism timing.

3. If Trouble Code is cleared, it means defective on ECU; If Trouble Code is not cleared, put back original ECU and repeat inspecting procedure to start again overhaul inspections. Following are implications of EFI System Trouble Code Diagnosis Measurements, Possible Reasons and their Solutions as references.

Trouble Code: P0030 Oxygen Sensor Heating Control Circuit Broken

Note	Note
Possible Troubles are as below 1）Circuit broken between ECU Pin and Oxygen Sensor Pin 2. 2）Circuit broken between Oxygen Sensor Pin 1 and Main Relay. 3）Circuit broken between Oxygen Sensor Pin 1 and Pin 2.	Inspect as below 1）Check if resistance between ECU Connector Pin and Oxygen Sensor Pin 2 is normal or not. 2）Check if resistance between Oxygen Sensor Pin 1 and Main Relay is normal or not. 3）Check if resistance between Oxygen Sensor Pin 1 and Pin 2 is normal or not.

Trouble Code: P0031 Oxygen Sensor Heating Circuit Short to Ground.

Note	Note
Possible Troubles are as below 1）Circuit connect to ECU Pin are short-to-ground.	Inspect as below 1）Check if resistance of ECU Pin to ground is normal or not.

Trouble Code: P0032 Oxygen Sensor Heating Circuit Short to Power

Note	Note
Possible Troubles are as below 1）Short Circuit between ECU Pin and Oxygen Sensor Pin 1. 2）Short Circuit between ECU Pin and other circuit.	Inspect as below 1）Check if resistance of ECU is normal or not. 2）Check if resistance between ECU Pin and Oxygen Sensor Pin 1 circuit is normal or not.

Trouble Code：P0053 Inner Resistance of Oxygen Sensor Heating not correct

Explanation: ECU system measure the Oxygen Sensor Heating Resistance to decide if heating output is correct or not. In some conditions, Heated Oxygen Sensor would be damaged by precipitate, especially while making cold start.

Note	Note
Possible Troubles are as below 1 ） Oxygen Sensor Heating function disable; Replace Oxygen Sensor.	Possible Troubles are as below 1) Check if resistance between Oxygen Sensor Pin 1 and Pin 2 is normal or not.

Trouble Code： Air Inlet Pressure Sensor no signal variable

Note	Note
Possible Troubles are as below 1）Air Inlet Pressure Sensor frozen or jammed. 2) Air Inlet Pressure Sensor seriously aging.	Possible Troubles are as below 1）Re-install the Air Inlet Pressure Sensor after ice melted with indoor temperature.

Trouble Code：P0106 Air Inlet Pressure Sensor Signal irrationally failure

Note Possible Troubles are as below 1）Air leakage of Air Inlet Pressure Sensor. 2）Air Inlet Pressure Sensor broken. 3）Air leakage from assemble point. 4 ） Air Inlet Pressure Sensor characteristically defluxion.	

Trouble Code：P0107 Low Voltage of Air Inlet Pressure Sensor Circuit

Note Possible Troubles are as below 1）ECU found Air Inlet Pressure Sensor signal circuit short to ground.	Note Inspect as below 1）Resistance between ECU Pin and Ground.

Trouble Code：P0108 High Voltage of Air Inlet Pressure Sensor Circuit

Note Possible Troubles are as below 1）ECU found Air Inlet Pressure Sensor signal circuit short to power.	Note Inspect as below 1）Resistance of ECU Pin.

Trouble Code：P0112 Air Inlet Temperature Sensor Signal Voltage Low.

Note Possible Troubles are as below 1) Circuit between ECU Pin and Air Inlet Temperature Sensor Signal short to ground.	Note Inspect as below 1）Check Resistance of circuit between ECU Pin Sensor Signal and Ground.

Trouble Code：P0113 Air Inlet Temperature Sensor Signal Voltage High.

Note Possible Troubles are as below 1 ） Circuit between ECU Pin and Air Inlet Temperature Sensor Signal short to power.	Note Inspect as below 1）Check if voltage of Sensor Signal of ECU Pin is normal or not.

Trouble Code: **Engine Water Temperature Sensor Indicated Temperature irrationally failure**

Note Possible Troubles are as below 1）Water Temperature Sensor need replacement	

Trouble Code：P0117 Engine Water Temperature Sensor Circuit Voltage low.

Note Possible Troubles are as below 1）Circuit between ECU Pin and ground short.	Note Inspect as below 1) Check resistance between ECU Pin and Ground.

Trouble Code：P0118 Engine Water Temperature Sensor Circuit Voltage high.

Note Possible Troubles are as below 1）Short Circuit between ECU circuit and other circuit.	Note Inspect as below 1) Check if voltage connected to ECU pin is normal or not.

Trouble Code：P0122 Voltage o f Throttle Control Positioning Sensor Circuit lower than the lower limit

Note Possible Troubles are as below 1） ECU Pin short to ground.	Note Inspect as below 1) Check resistance between ECU pin and ground.

Trouble Code：P0123 Voltage o f Throttle Control Positioning Sensor Circuit higher than the higher limit

Note Possible Troubles are as below 1）Circuit between ECU Pin and other power circuit short.	Note Inspect as below 1) Check if ECU Pin voltage is normal or not.

Trouble Code：P0130 Oxygen Sensor Signal irrationally failure

Explanation: When Oxygen Sensor Signal happens with situations as below, System decide Oxygen Sensor Signal irrationally failure

Oxygen Sensor Signal Circuit coupling with Heating Circuit.

Note Possible Troubles are as below 1）Check if Oxygen Sensor Connector is correct or not. 2）Check if Oxygen Sensor Signal Circuit coupling with Heating Circuit.	

Trouble Code：P0131 Oxygen Sensor Circuit Voltage Low

Note Possible Troubles are as below 1) Signal Circuit connected with ECU Pin is short circuit to ground.	Note Inspect as below 1）Check resistance between Signal Circuit connected with ECU Pin and ground.

Trouble Code：P0132 Oxygen Sensor Circuit Voltage High

Explanation： When engine starts, ECU check the Oxygen Sensor Circuit Voltage; When voltage is continuously higher than 1.5 Volt, system decides Oxygen Sensor Circuit Voltage is short to power.

Note	Note
Possible Troubles are as below 1）Short Circuit between Signal Circuit connect to ECU Pin and Oxygen Sensor Oxygen Sensor Pin 1. 2）Short Circuit between Signal Circuit connect to ECU Pin and other power circuit.	Inspect as below 1 ）Check resistance between Signal Circuit connect to ECU Pin and Oxygen Sensor Oxygen Sensor Pin 1 2）Check resistance of Signal Circuit connect to ECU Pin

Trouble Code：P0133 Oxygen Sensor Aging

Explanation: Normally Air Fuel Ratio of Fuel and Air is shifting between Dense and Dilute; accordingly Oxygen Sensor signal variate among different values. When Oxygen Sensor is aging, it goes less sensitive to Fuel-Air-Mixture, which makes signals variate lower. ECU makes average cycle calculations to Signal Variation; when it finds cycling slower as set, it decides Oxygen Sensor Aging.

Note	
Possible Troubles are as below 1）Oxygen Sensor Aging, need replacement.	

Trouble Code：P0134 Oxygen Sensor Signal Failure

Explanation：When engine starts, ECU check the Oxygen Sensor Circuit Voltage; When ECU finds voltage stays between 0.4-0.6 volt, it decides Oxygen Sensor Signal Circuit Short.

Note	Note
Possible Troubles are as below 1 ） Short Circuit between Oxygen Sensor connected to ECU Pin. 2 ） Bad connection of Oxygen Sensor Connectors.(Socket Oxidized)	Inspect as below 1）Check resistance between ECU connector and Oxygen Sensor 4.

Trouble Code： P0170 Self Studying found Closing Loop control Air Fuel Ratio irrational when making End o f Line Testing.

Trouble Code：P0171 Self Studying found Closing Loop control Air Fuel Ratio too dulate when making End o f Line Testing.

Trouble Code：P0172 Self Studying found Closing Loop control Air Fuel Ratio too dense when making End o f Line Testing.

(Note: This Inspection Process is only suitable when Air Inlet Pressure Sensor, Canister Control Valve and Oxygen Sensor and so on has not shown with Trouble Code; If there is any other Trouble Code, solve other Troubles first and then inspect Fuel Route correct or not)

Trouble Code：P0201 Cylinder Injector Control Circuit Open

Note	Note
Possible Troubles are as below 1） Injector Coil Open Circuit 2） Injector Connector Sock et to ECU Pin bad connection 3） Injector Connector Socket to Main Relay bad connection	Inspect as below 1） Check resistance of Injector 2)Check cable is connected or not

Errors coding: P0261 Control circuit of single cylinder injector short to ground

Maintenance Tips： The possible faults may exists as follow: 1）All drivers ECU pin connected short to ground	Maintenance Tips： Check the item as follow: 1）Measure ECU pin connected resistance to ground

Errors coding: P0262 Control circuit of single cylinder injector short circuit

Maintenance Tips： The possible faults may exists as follow: 1 ） Short circuit between circuit ECU connected and other electrical source circuits	Maintenance Tips： Check the item as follow: 1）Measure the voltage of circuit ECU pin connected

Errors coding: P0321 reference point of rotate speed sensor fault

Maintenance Tips： The possible faults may exists as follow: 1） Circuits connect intermittently short circuit or intermittently open circuit. 2） Fixed position of crankshaft signal ring deviation declination. 3） Fixed position of rotate speed sensor declination.	Maintenance Tips： Check the items as follow: 1） Check the connection or breaking of cable related connection. 2） Check the quantity of magneto flywheel.

Errors coding: P0322 Non-rotate speed sensor pulse signal (short circuit or open circuit)

Explanation: After starting engine, ECU will measure signal of trigger and other signals together, judging the losing of trigger signal by signal rationality system.

Maintenance Tips： The possible faults may exists as follow: 1）Trigger rotate speed sensor ECU cable connected open circuit 2 ） Trigger circuit ECU connected short circuit. 3）Trigger coil open circuit.	Maintenance Tips： 1） Measure resistance between trigger and ECU cable connected 2） Measure resistance of trigger 3） Measure trigger peak value voltage

Errors coding: P0444 Control circuit voltage of idle air control valve open circuit

Maintenance Tips： The possible faults may exists as follow: 1 ） Open circuit between ECU circuit connected and no.2 pin of idle air control valve. 2）The circuit that no.1 pin of idle air control valve connected to main relay open way. 3）Electromagnetism coil between no.1 pin and no.2 pin open way.	Maintenance Tips： 1） Check the connection or breaking of cable related connection. 2） Measure resistance of idle speed valve.

Errors coding: P0458 Control circuit voltage of idle air control valve too low

Maintenance Tips： The possible faults may exists as follow: 1）Circuit ECU connected is short circuit	Maintenance Tips：Check the item as follow: 1 ） Measure connected to the ECU pin-to-ground resistance whether proper or not

Errors coding: P0459 Control circuit voltage of idle air control valve too high

Maintenance Tips： The possible faults may exists as follow: 1）Short circuit between ECU circuit connected and No.1 pin of idle air control valve. 2）Short circuit between circuit ECU pin connected and other electrical source circuits	Maintenance Tips： Check the item as follow: 1）Measure the voltage of ECU pin whether normal or not 2）Measure resistance between ECU pin and No.1 pin of idle air control valve

Errors coding: P0501Speed sensor signal improper.

Explanation: When loose throttle and keep direct to free-wheel, ECU measure engine rotate speed and vehicle speed together. If engine lasting higher speed but vehicle speed display “0” or too low obviously, system will judge that vehicle speed signal faults.

Maintenance Tips： The possible faults may exists as follow: 1）The signal circuit ECU connected and vehicle speed sensor short to ground or open to ground.	Maintenance Tips： Check the item as follow: 1) Check circuit resistance that connecter of ECU joint to vehicle speed signal sensor. 2）Check resistance to ground of ECU pin.

Errors coding: P0506 Rotate speed of idle air control valve slower than target idle speed

Explanation: Engine rotate speed of idle speed control valve works by closed-loop control. And it indicates fault if ECU performs idle speed controlling after a certain time, but the actual engine speed still slower than target idle speed.

Maintenance Tips： The possible faults may exists as follow: 1） Idle air control valve not work. 2） Check adjust bolt of throttle valve、throttle cable、throttle operating condition etc. whether are in condition or not. 3）Too dirty inside of throttle valve body	

Errors coding: P0507

Rotate speed of idle speed control valve faster than target idle speed

Introduction of theory and fault reason: Engine rotate speed of idle speed works by closed-loop control. And it indicates fault if ECU performs idle speed controlling after a certain time, but the actual engine speed faster than target idle speed.

Maintenance Tips： The possible faults may exists as follow: 1）Check adjust bolt of throttle valve、 throttle cable、throttle operating condition etc. whether are in condition or not. 2）Too dirty inside of throttle valve body 3 ）Check crankcase enforced-air flue whether breaks off or leaks	

Errors coding: P0560 Voltage signal of system battery illogicality

Errors coding: P0562 Voltage signal of system battery is too low

Errors coding: P0563 Voltage signal of system battery is too high

Maintenance Tips： The possible faults may exists as follow: 1）Magneto damaged and disable to starting or battery electric leakage 2）Magneto stator coil open circuit 3）Regulator of Magneto damaged	Maintenance Tips： Check the item as follow: 1) Check the capability of generate electricity of Magneto(measure voltage of Magneto after starting)

Errors coding: P0627 Control circuit of oil pump relay open circuit

Errors coding: P0628 Control circuit of oil pump relay short to ground

Errors coding: P0629 Control circuit of oil pump relay short circuit

Maintenance Tips： The possible faults may exists as follow: 1 ）Open circuit/short to ground/short circuit between control circuit of oil pump relay connected to ECU and oil pump. 2）Open circuit between relay and main relay 3）Magnet coil of relay open circuit	Maintenance Tips： Check the items as follow: 1）Measure resistance or voltage of oil pump relay control circuit connected to ECU. 2）resistance between relay and main relay 3）resistance between the toes of relay

Errors coding: P0650 MIL lamp-driver circuit fault

Maintenance Tips： The possible faults may exists as follow: 1）Open circuit/short to ground/short circuit on circuit of MIL lamp-driver connected to ECU. 2）Open circuit between MIL and main relay. 3）MIL lamp burnout	Maintenance Tips： Check the item as follow: 1 ）Measure resistance or voltage of MIL lamp-driver control circuit connected to ECU.

Errors coding: P2177

Self-learning value of air-fuel ratio, closed-loop control exceeds upper limit

Errors coding: P2178

Self-learning value of air-fuel ratio, closed-loop control exceeds lower limit

Introduction of theory and fault reason: In order to make catalytic converters for HC, CO and NOx to maximize conversion efficiency, the air-fuel ratio of mixture should be 14.7:1. When the engine occurs, parts manufacturing deviation, deposition of fuel colloid on fuel injector, intake or back of valve, gas leak of intake and exhaust system, will cause the air-fuel ratio(14.7:1) deviation in various degrees(partial dilute or partial concentration) which will lead to emission deterioration and poor engine performance. Engine control system will amend and self-learning fuel charge based on the extent and character is tics of air-fuel ratio deviation. When self-learning value reach the limit of system setting (gas mixture partial dilute or partial concentration, system amends the fuel charge constantly till Max), system will judge that self-learning value transfinite fault.

Maintenance Tips：

The possible faults may exists as follow:

1）Injector clog needs cleaning

2）Intake and exhaust system leaks

3）Inlet or back of intake valve has carbon build-up, needs to be decarbonized.

4）Engine parts deviation

5）Valve clearance deviation

6）Fuel system pressure deviation

3.Diagnosis troubles according to engine fault phenomena

Before start to diagnosis fault, please take the primary inspection first:

1.Engine failure indicator light works regularly.

2.Affirm that no errors Code have been found by Diagnosis Analyze.

3.Affirm the fault that user complaint is exist, and affirm the condition of fault happened.

Then, take external inspection:

（1） Check fuel pipe for has fuel leaks.

（2） Check vacuum tube if rupture, kink or incorrect connection.

（3） Check air intake pipe whether clogged, leaked, been staved or damaged or not.

（4） Check ignition c oil of ignition system whether rupture, aged or not, firing sequence whether correct or not；

（5） Check ground of wiring harness make sure it's c lean and tight.

（6） Check connections for loose or poor contacts or not.

Notice：Pleas e maintain the faults as above in advance. If not, the further fault diagnosis will be affected.

Diagnosis help:

1.Engine has no fault records；

2.Affirm the complaint of fault happened；

3. Do not ignore vehicle maintenance working, cylinder pressure, mechanism timing, fuel etc effect against system during overhaul

4. Replace ECU and test it.
   If Trouble Code is cleared, it means defective on ECU;
   If Trouble Code is not cleared, put back original ECU and repeat inspecting procedure to start again overhaul inspections.

Troubleshooting：

- Starting Failure/Hard Starting.
- Engine can rotate but will not start.
- Hard Starting when hot.
- Hard Starting when cold.
- Hard Starting all the time.
- Engine work s regularly，but unsteady idle speed all the time.
- Engine work s regularly，but unsteady idle speed when engine is in warming-up.
- Engine starting normally, but idle speed unsteady after warming-up.
- Engine starting normally, but unsteady idle speed or power off when idles.
- Engine starting regularly, but idle speed is too high.
- Rotate speed can not increase or engine power off when in acceleration.
- Reaction slowly when in acceleration.
- No power and poor performance when in acceleration

（1）Starting Failure/Hard Starting

Possible defective part ：1.Battery；2.Starter motor；3. Wiring harness or ignition switch;4.engine mechanism part.

Overhaul:

Ref No.	Operation	Test result	Next Steps
1	Check the voltage between the two poles of battery by multimeter, the voltage whether around 8-12V or not when engine starting.	yes	next
		no	Replace battery
2	Keep ignition switch in engine starting station. Check positive pole of Starter motor by multimeter, the voltage whether above 8V or not.	yes	next
		no	Repair or replace wiring harness
3	Remove starter motor and check its working condition, if circuit break or starter motor locked because of improper lubricate.	yes	Repair or replace Starter Motor
		no	next
4	Fault only happens on winter, please check lubricating oil if is improper for engine which caused high resistance of starter motor.	yes	Replace appropriate grade of lubricating oil
		no	next
5	Check the resistance inside of engine mechanism whether is high or not, which makes starter motor stop rotates or rotate slowly.	yes	Overhaul the resistance inside of engine mechanism
		no	Repeat above steps

（2）Engine can rotate but starting failure

Possible defective part：1、no gasoline in tank；2、Fuel pump；3、Trigger；4、Ignition coil；5、engine mechanism part.

Overhaul:

Ref No.	Operation	Test result	Next Steps
1	Contact fuel pressure meter(contact front point of oil input pipe of injector)，open ignition switch and repeat it if possible, or starting engine, check the fuel pressure whether is around 300kPa or not	yes	next
		no	examine and repair oil support system
2	Contact Electronic injection diagnostic meter, observe item of “engine rotate speed”, starting engine, and observe the rotate speed signal if is normally output.	yes	next
		no	examine and repair sensor wiring of rotate speed
3	Pull out ignition coil, and contact with spark plug, keep pole of spark plug 5mm with body of engine, starting engine and check it whether has blue-white high spark.	yes	next
		no	Examine and repair ignition system.

4	Check compression of cylinder and observe the pressure if is discrepantly.	yes	Eliminate engine mechanism fault
		no	next
5	Contact EFI commutator, open ignition switch, check ECU5#、10#、13# stitch, the power whether supply normally or not, check 2#、21# stitch whether Put up iron or not.	yes	Diagnosis help
		no	Examine and repair relevant wiring

（3）Hard Starting in normal status

Possible defective part：1、fuel containing water；2、fuel pump；3、engine water temperature sensor；4、ignition coil

Overhaul:

Ref no	Operation	Test result	Next Steps
1	Contact fuel pressure meter(contact front point of oil input pipe of injector), starting engine, check the fuel pressure whether is around 300kPa or not	yes	next
		no	examine and repair oil support system
2	Pull out ignition coil, and contact with s park plug, keep pole of spark plug 5mm with body of engine, starting engine and check it whether has blue-white high pressure fire or not.	yes	next
		no	Examine and repair ignition system.
3	Pull out connector of engine water temperature sensor, starting engine, observe engine whether succeed starting or not at this moment. (or in series a 300Ω resistant instead of engine water temperature sensor, observe engine whether succeed starting or not at this moment.)	yes	Examine and repair wiring or replace sensor
		no	Next
		no	Next
4	Check fuel and observe the fault if caused after fueling	yes	Replace fuel
		no	next
5	Contact EFI commutator, open ignition switch, check ECU5#、10#、13# stitch the power whether supply normally or not, check 2#、21# stitch whether Put up iron or not.	yes	Diagnosis help
		no	Examine and repair relevant wiring

（4）Hard Starting in cold status

Possible defective part：1、fuel containing water；2、fuel pump；3、engine water temperature sensor；4、injector；5、ignition coil；6、throttle valve body and idle speed side air duct; 7、engine mechanism part 。

Overhaul:

Ref no	Operation	Test result	Next Steps
1	Contact fuel pressure meter(contact front point of oil input pipe of injector), starting engine, check the fuel pressure whether is around 300kPa or not	yes	next
		no	examine and repair oil support system
2	Pull out ignition coil, and contact with spark plug, keep pole of spark plug 5mm away of body of engine, starting engine and check it whether has blue-white spark fire or not.	yes	next
		no	Examine and repair ignition system.
3	Pull out connector of engine water temperature sensor, starting engine, observe engine whether succeed starting or not at this moment. (or in series a 2500Ωresistant instead of engine water temperature sensor, observe engine whether succeed starting or not at this moment.)	yes	Examine and repair wiring or replace sensor
		no	next
4	Draw accelerograph gently, observe it whether starting engine easily or not.	yes	Clean throttle valve body and idle speed air duct
		no	next
5	Disassembly injector, and check the injector by special washing analysis instrument if exists the phenomena of leaks or clogs	yes	Replace
		no	next
6	Check fuel and observe the fault if caused after fueling	yes	Replace fuel
		no	next
7	Check compression of cylinder and observe the pressure if it is discrepantly.	yes	Eliminate engine mechanism fault
		no	next
8	Contact EFI commutator, open ignition switch, check ECU5#、10#、13# stitch, the power whether supply normally or not, check 2#、21# stitch whether Put up iron or not.	yes	Diagnosis help
		no	Examine and repair relevant wiring

（5）Regularly rotate speed, but engine starting hard at any time

Possible defective part：1、fuel containing water；2、fuel pump；3、engine water temperature sensor；4、injector；5、ignition coil；6、throttle valve body and idle speed side air duct; 7、input air duct；8、ignition timing；9、spark plug；10、engine mechanism part

Overhaul:

Ref no	Operation	Test result	Next Steps
1	Check air cleaner and input air duct whether are clogged or not	yes	Examine and repair air input system
		no	next

2	Contact fuel pressure meter (contact front point of oil input pipe of injector), starting engine, check the fuel pressure whether is around 300kPa or not	yes	next
		no	examine and repair oil support system
3	Pull out ignition coil, and contact with spark plug, keep pole of spark plug 5mm away with body o f engine, starting engine and check it whether has blue-white high pressure fire or not.	yes	next
		no	examine and repair ignition system
4	Check spark plug, look its type and gap if accords with standard.	yes	next
		no	Adjust or replace
5	Pull out connector of engine water temperature sensor, star ting engine, observe engine whether succeed starting or not a t this moment.	yes	Examine and repair wiring or replace sensor
		no	next
6	Draw accelerograph gently, observe it whether starting engine easily o r not.	yes	Clean throttle valve body and idle speed air duct
		no	next
7	Disassembly injector, and check the injector by special washing analysis instrument if exists the phenomena of leaks or clogs	yes	replace
		no	next
8	Check fuel and observe the fault i f caused after fueling	yes	Replace fuel
		no	next
9	Check compression o f cylinder and observe the pressure if is discrepantly.	yes	Eliminate engine mechanism fault
		no	next
10	Check engine ignition timing if accords with standard .	yes	next
		no	examine and repair ignition timing
11	Contact EFI commutator, open ignition switch, check ECU5#、10#、13# stitch the power whether supply normal or not, check 2#、21# stitch whether Put up iron r not.	yes	Diagnosis help
		no	Examine and repair relevant wiring

（6）Eng in e works regularly，but unsteady idle speed at any time

Possible defective part：1、fuel containing water；2、injector ; 3、spark plug；4、throttle valve body and idle speed side air duct；5、input air duct；6、id le speed valve; 7、ignition timing；8、engine mechanism part

Overhaul :

Ref no	Operation	Test result	Next Steps
1	Check air cleaner and input air duct whether are clogged o r not	yes	Examine and repair air input system
		no	next

2	Check idle speed valve whether clogged or not.	Yes	Clean or replace
		no	next
3	Check spark plug, look its type and gap if accords with standard.	Yes	next
		no	Adjust or replace
4	Check throttle valve body and idle speed side air duct whether have carbide accumulated or not.	Yes	Clean
		no	next
5	Disassembly injector, and check the injector by special washing analysis instrument if exists the phenomena of leaks, clogs or flux discrepantly.	Yes	Fault replacement
		no	next
6	Check fuel and observe the fault if caused after fueling	Yes	Replace fuel
		no	next
7	Check compression of cylinder and observe the pressure if is discrepantly.	Yes	Eliminate engine mechanism fault
		no	next
8	Check engine ignition timing if accords with standard.	Yes	next
		no	examine and repair ignition timing
9	Contact EFI commutator, open ignition switch, check ECU5#、10#、13# stitch, the power whether supply normal or not, check 2#、21# stitch whether Put up iron or not.	Yes	Diagnosis help
		no	Examine and repair relevant wiring

（7）Engine works regularly，but unsteady idle speed when engine is in warming-up

Possible defective part：1、fuel containing water 2、engine water temperature sensor；3、spark plug；4、throttle valve body and idle speed side air duct; 5、input air duct；6、idle speed valve；7、engine mechanism part

Overhaul:：

Ref no	Operation	Test result	Next Steps
1	Check air cleaner and input air duct whether are clogged or not	yes	Examine and repair air input system
		no	next
2	Check spark plug, look its type and gap if accords with standard.	yes	next
		no	Adjust or replace
3	Disassembly idle speed valve and check the throttle valve body, idle speed valve and idle speed side air duct whether have carbide accumulated or not.	yes	Clean related parts
		no	next
4	Pull out connector of engine water temperature sensor, starting engine, observe idle speed whether is unsteady or not when engine is in warming-up.	yes	Examine and repair wiring or replace sensor
		no	next
	Disassembly injector, and check the injector by	yes	Fault replacement

5		no	next
6	Check fuel and observe the fault if caused after fueling	yes	Replace fuel
		no	next
7	Check compression of cylinder and observe the pressure.	yes	Eliminate engine mechanism fault
		no	next
8	Contact EFI commutator, open ignition switch, check ECU5#、10#、23# stitch, the power whether supply normal or not, check 2#、21# stitch whether Put up iron or not.	yes	Diagnosis help
		no	Examine and repair relevant wiring

（8）Engine starting normally, but idle speed unsteady after warming-up.

Possible defective part：1、fuel containing water 2、engine water temperature sensor；3、spark plug；4、throttle valve body and idle speed side air duct; 5、input air duct；6、idle speed valve；7、engine mechanism part

Overhaul:

Ref no	Operation	Test result	Next Steps
1	Check air cleaner and input air duct whether are clogged or not	yes	Examine and repair air input system
		no	next
2	Check spark plug, look its type and gap if accords with standard.	yes	next
		no	Adjust or replace
3	Disassembly idle speed valve and check the throttle valve body, idle speed valve and idle speed side air duct whether have carbide accumulated or not.	yes	Clean related parts
		no	
4	Pull out connector of engine water temperature sensor, starting engine, observe idle speed whether is unsteady or not when engine is in warming-up.	yes	
		no	
5	Disassembly injector, and check the injector by special washing analysis instrument if exists the phenomena of leaks, clogs or flux discrepantly.	yes	
		no	
6	Check fuel and observe the fault if caused after fueling	yes	
		no	
7	Check compression of cylinder and observe the pressure if it is discrepantly.	yes	
		no	
8	Contact EFI commutator, open ignition switch, check ECU5#、 10#、23# stitch, the power whether supply normal or not, check 2#、21# stitch whether Put up iron or not.	yes	
		no	

（9）Engine starting normally, but unsteady idle speed or power off when engine in partly loading(such as: opening head light)

Possible defective part：1、idle speed valve；2、injector

Overhaul:

Ref no	Operation	Test result	Next Steps
1	Disassembly idle speed valve and check the throttle valve body, idle speed valve and idle speed side air duct whether have carbide accumulated or not.	yes	Clean related parts
		no	next
2	Observe output power whether is increasing or not when begin loading work, namely observe the movement of ignition advance angle、injection pulse width and air intake flowrate by EFI diagnosis instrument	yes	Turn step no.4
		no	next
		no	Examine and repair air condition system
3	Disassembly injector, and check the injector by special washing analysis instrument if exists the phenomena of leaks, clogs or flux discrepantly.	ye	Fault replacement
		no	next
4	Contact EFI commutator, open ignition switch, check ECU5#、10#、23# stitch, the power whether supply normal or not, check 2#、21# stitch whether is putting up iron or not.	yes	Diagnosis help
		no	Examine and repair relevant wiring

（10）Engine starting regularly, but idle speed is too high.

Possible defective part：1、throttle valve body and idle speed side air duct； 2、injector seat；3、idle speed valve；4、engine water temperature sensor；5、ignition timing.

Overhaul:

Ref no	Operation	Test result	Next Steps
1	Check the throttle cable if is clipped or too tight.	yes	adjust
		no	next
2	Check air intake system and connector of injector seat, the air if is leaking.	yes	Examine and repair air intake system
		no	next
3	Disassembly idle speed valve and check the throttle valve body, idle speed valve and idle speed side air duct whether have carbide accumulated or not.	yes	Clean related parts
		no	next
4	Pull out connector of engine water temperature sensor, starting engine, observe idle speed whether is unsteady or not when engine is in warming-up.	yes	Examine and repair wiring or replace sensor
		no	next
5	Check engine ignition timing if accords with standard.	yes	next
		no	examine and repair ignition timing

6	Contact with EFI commutator, open ignition switch, check ECU5#、10#、23# stitch, the power whether supply normal or not, check 2#、21# stitch whether is putting up iron or not.	yes	Diagnosis help
		no	Examine and repair relevant wiring

（ 11）Rotate speed can not increase or engine power off when in acceleration.

Possible defective part：1、fuel containing water； 2、air intake pressure sensor and throttle position sensor；3、spark plug；4、throttle valve body and idle speed side air duct；5、input air duct；6、idle speed valve；7、fuel injector；8、ignition timing； 9、muffler

Overhaul:

Ref no	Operation	Test result	Next Steps
1	Check air cleaner if is clogged.	yes	Examine and repair air input system
		no	next
2	Contact fuel pressure meter(contact front point of oil input pipe of injector), starting engine, check the fuel pressure whether is around 300kPa or not	yes	next
		no	examine and repair oil support system
3	Check spark plug, look its type and gap if accords with standard.	yes	next t
		no	Adjust or replace
4	Disassembly idle speed valve and check the throttle valve body, idle speed valve and idle speed side air duct whether have carbide accumulated or not.	yes	Clean related parts
		no	next
5	Check air intake pressure sensor、 throttle position sensor and their wiring whether works regularly or not.	yes	next
		no	examine and repair wiring or replace sensor
6	Disassembly injector, and check the injector by special washing analysis instrument if exists the phenomena of leaks, clogs or flux discrepantly.	yes	Fault replacement
		no	next
7	Check fuel and observe the fault if caused after fueling	yes	Replace fuel
		no	next
8	Check engine ignition timing if accords with standard.	yes	next
		no	examine and repair ignition timing
9	Check the exhaust gas from muffler if exhausts smoothly	yes	next
		no	Repair or replace muffler
10	Contact with EFI commutator, open ignition switch, check ECU5#、10#、23# stitch, the power whether supply normal or not, check 2#、21# stitch whether is putting up iron or not	yes	Diagnosis help
		no	Examine and repair relevant wiring

（12）Reaction slowly when in acceleration.

Possible defective part：1、fuel containing water；2、air intake pressure sensor and throttle position sensor；3、spark plug；4、throttle valve body and idle speed side air duct；5、input air duct；6、idle speed valve；7、fuel injector；8、ignition timing；9、muffler

Overhaul：

Ref no	Operation	Test result	Next Steps
1	Check air cleaner if is clogged.	yes	Examine and repair air input system
		no	next
2	Contact fuel pressure meter(contact front point of oil input pipe of injector), starting engine, check the fuel pressure whether is around 300kPa or not	yes	next
		no	examine and repair oil support system
3	Check spark plug, look its type and gap if accords with standard.	yes	next
		no	Adjust or replace
4	Disassembly idle speed valve and check thethrottle valve body, idle speed valve and idle speed side air duct whether have carbide accumulated or not.	yes	Clean related parts
		no	next
5	Check air intake pressure sensor throttle position sensor and their wiring whether works regularly or not.	yes	next
		no	examine and repair wiring or replace sensor
6	Disassembly injector, and check the injector by special washing analysis instrument if exists the phenomena of leaks, clogs or flux discrepantly.	yes	Fault replacement
		no	next
7	Check fuel and observe the fault if caused after fueling	yes	Replace fuel
		no	next
8	Check engine ignition timing if accords with standard.	yes	next
		no	examine and repair ignition timing
9	Check the exhaust gas from muffler if exhausts smoothly	yes	next
		no	Repair or replace muffler
10	Contact with EFI commutator, open ignition switch, check ECU5#、10#、23# stitch, the power whether supply normal or not, check 2#、21# stitch whether is putting up iron or not.	yes	Diagnosis help
		no	Examine and repair relevant wiring

（13）No power and poor performance when in acceleration.

Possible defective part：1、fuel containing water；2、air intake pressure sensor and throttle position sensor；3、spark plug；4、ignition coil; 5、throttle valve body and idle speed side air duct；6、input air duct；7、idle speed valve；8、fuel injector；9、ignition timing；10、muffler

Overhaul：

Ref no	Operation	Test result	Next Steps
1	Check the faults if exist clutch skid, low tyre pressure, lagged brake, improper tyre size etc.	yes	repair
		no	next
2	Check air cleaner if is clogged.	yes	Examine and repair air input system
		no	next
3	Contact fuel pres sure meter(contact front point of oil input pipe of injector), starting engine, check the fuel pressure whether is around 300kPa or not	yes	next
		no	examine and repair oil support system
4	Pull out ignition coil, and contact with s park plug, keep pole of spark plug 5mm away with body of engine, starting engine and check the high pressure fire whether is norm al o r not.	yes	next
		no	examine and repair ignition system
5	Check spark plug, look its type and gap if accords with standard.	yes	next
		no	Adjust or replace
6	Disassembly idle speed valve and check the throttle valve body, idle speed valve and idle speed side air duct whether have carbide accumulated or not.	yes	Clean related parts
		no	next
7	Check air intake pressure sensor, throttle position sensor and their wiring if works regularly.	yes	next
		no	examine and repair wiring or replace sensor
8	Disassembly injector, and check the injector by special washing analys is instrument if exists the phenomena of leaks and clogs.	yes	Fault replacement
		no	next
9	Check fuel and observe the fault if caused after fueling	yes	Replace fuel
		no	next
10	Check engine ignition timing if ac cords with standard.	yes	next
		no	examine and repair ignition timing
11	Check the exhaust gas from muffler if exhausts smoothly	yes	next
		no	Repair or replace muffler
12	Contact with EFI commutator, open ignition switch, check ECU5# 、10#、23# stitch, the power whether supply normal or not, check 2#、21# stitch whether is putting up iron or not.	yes	Diagnosis help
		no	Examine and repair relevant wiring